



Vehicle Miles Traveled Case Studies

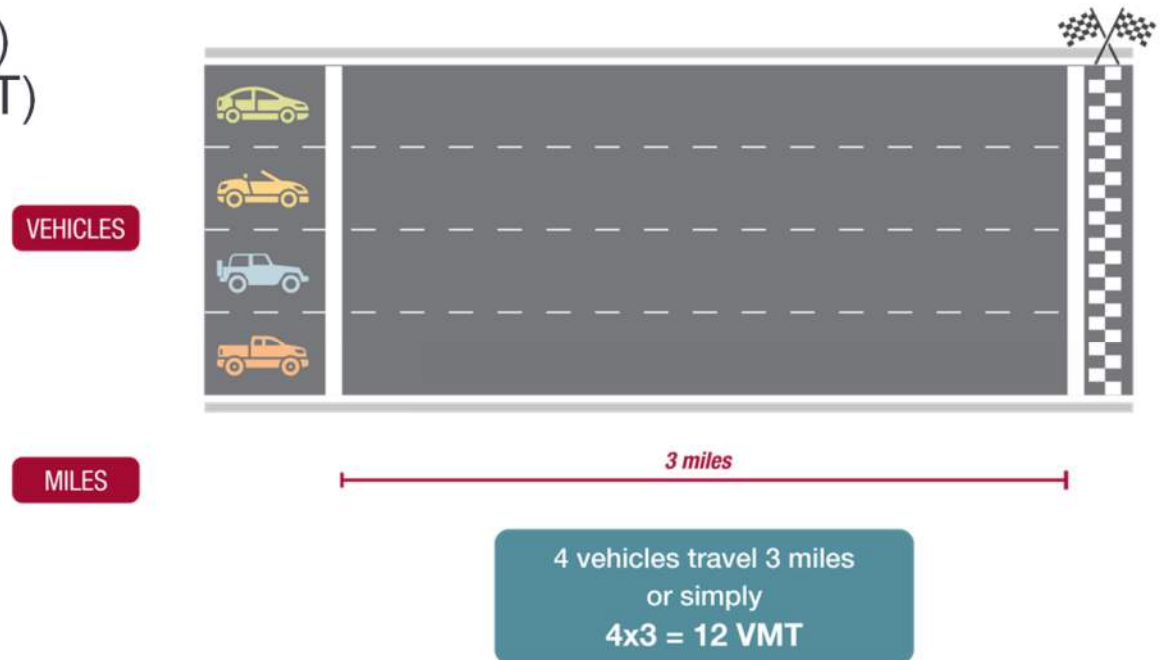
April 10, 2024

Kimley»Horn



Agenda

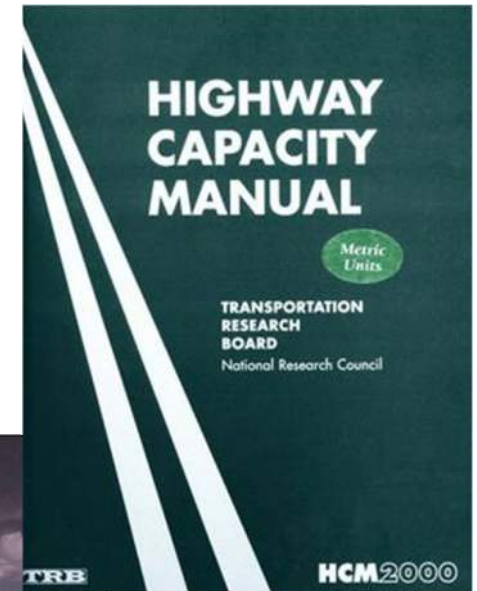
- History of level of service (LOS) and vehicle miles traveled (VMT)
- VMT Trends
- Project VMT Case Studies
- Regional VMT Case Studies
- Induced Demand
- Takeaways





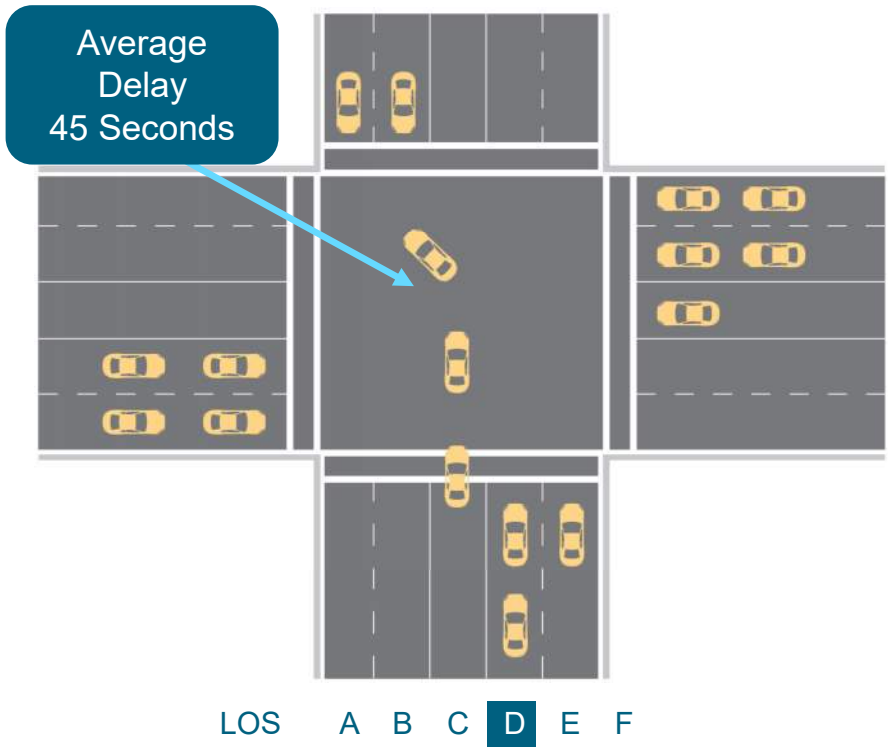
History of LOS

- First Edition of HCM published in 1950
- There have been seven editions
- Significantly guided transportation decision-making
- 70 year later its application has been tied to
 - Urban sprawl
 - Impacts to active transportation
 - Induced demand



Level of Service

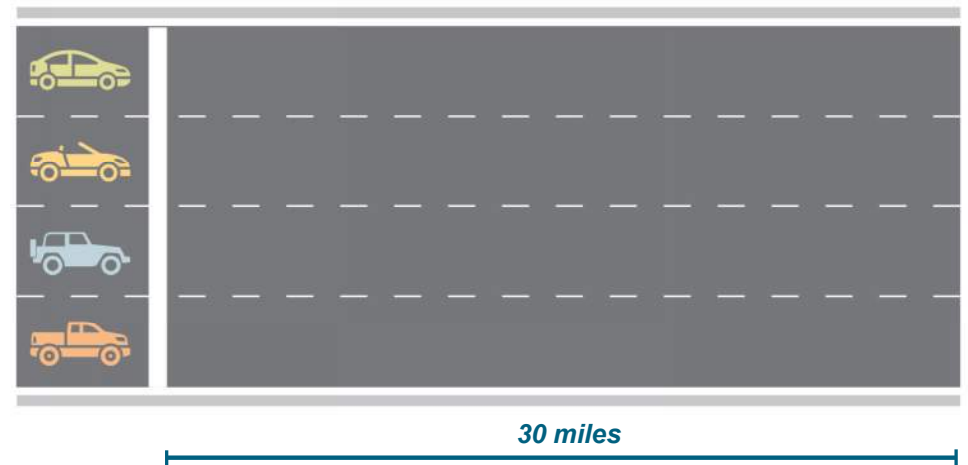
Impact to the Driver



Highway Capacity Manual

Vehicle Miles Traveled

Driver's Impact to Transportation System



4 vehicles travel 30 miles
or simply
 $4 \times 30 = 120 \text{ VMT}$

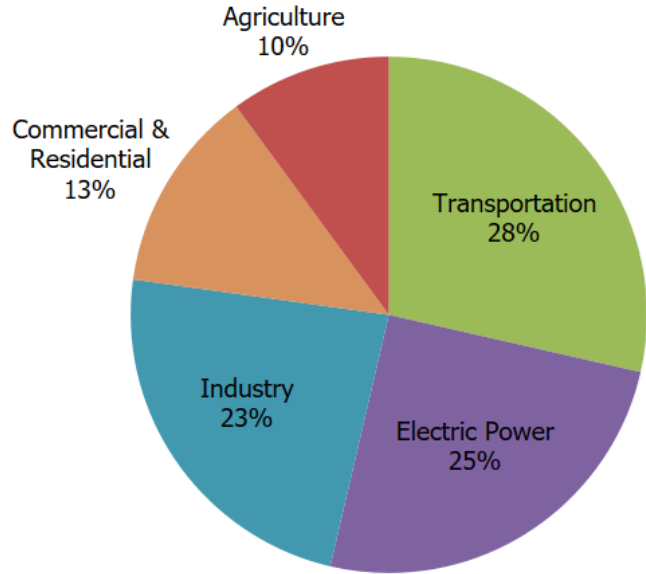
120 VMT / 6
Drivers/Passengers =
20 VMT/Capita

Travel Demand Model

Vehicle Miles Traveled Case Studies

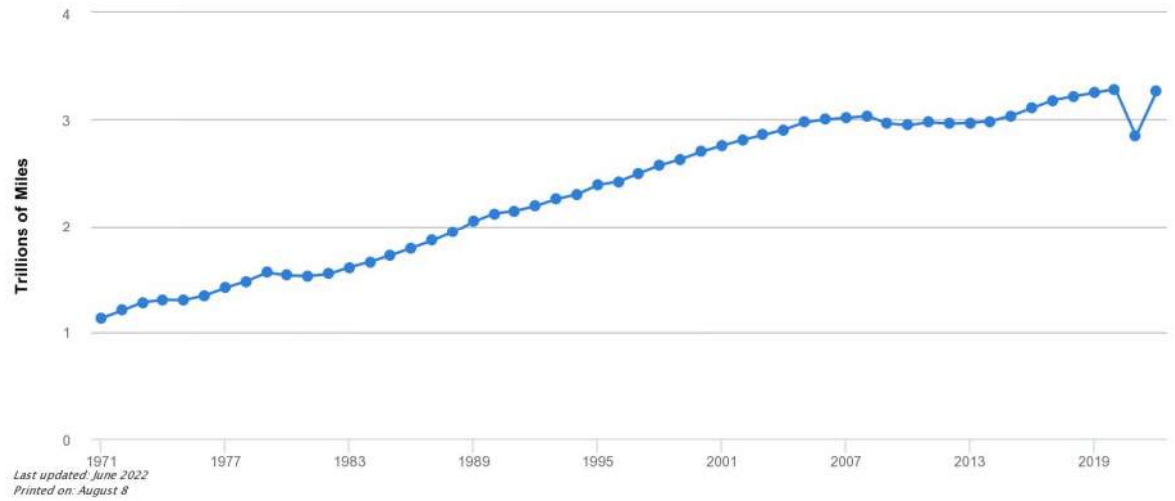


VMT Trends



<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

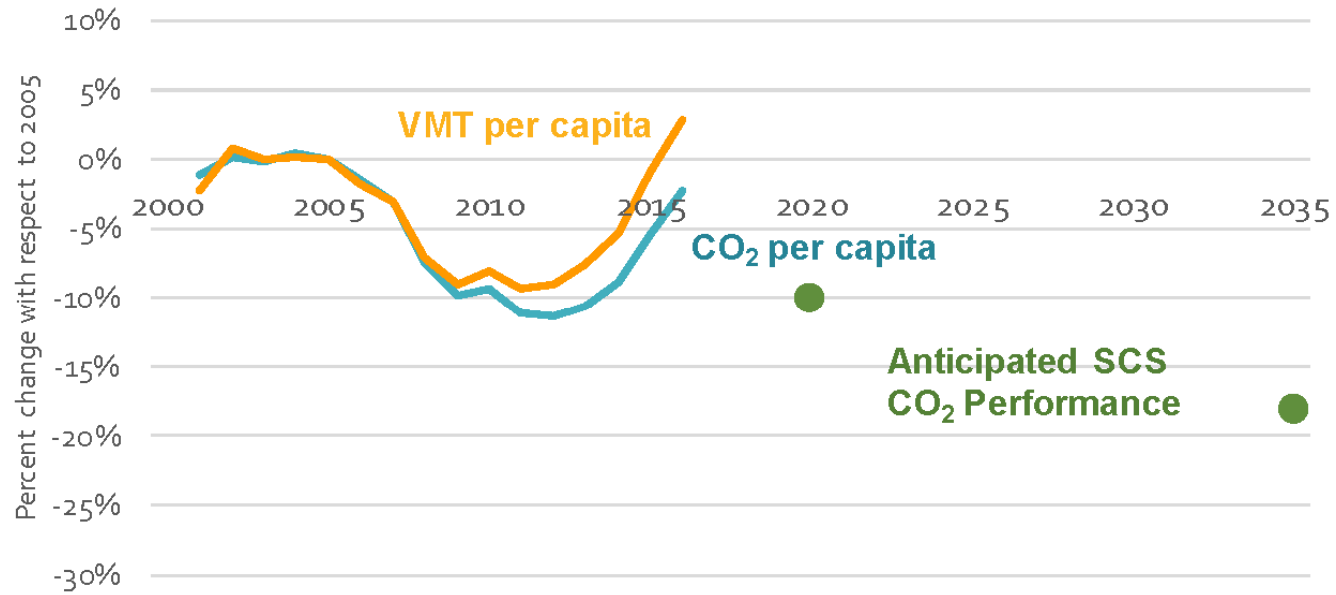
Annual Vehicle Miles Traveled in the United States



<https://afdc.energy.gov/data/10351>



SB 150 Final Report





SB 743 Overview

- Added requirements for project level analysis
- Sustainability and GHG reduction by
 - Denser infill development
 - Reducing single occupancy vehicles
 - Improved mass transit
- VMT is the principal metric



SB 743 Example #1

Facts

Land Use Description

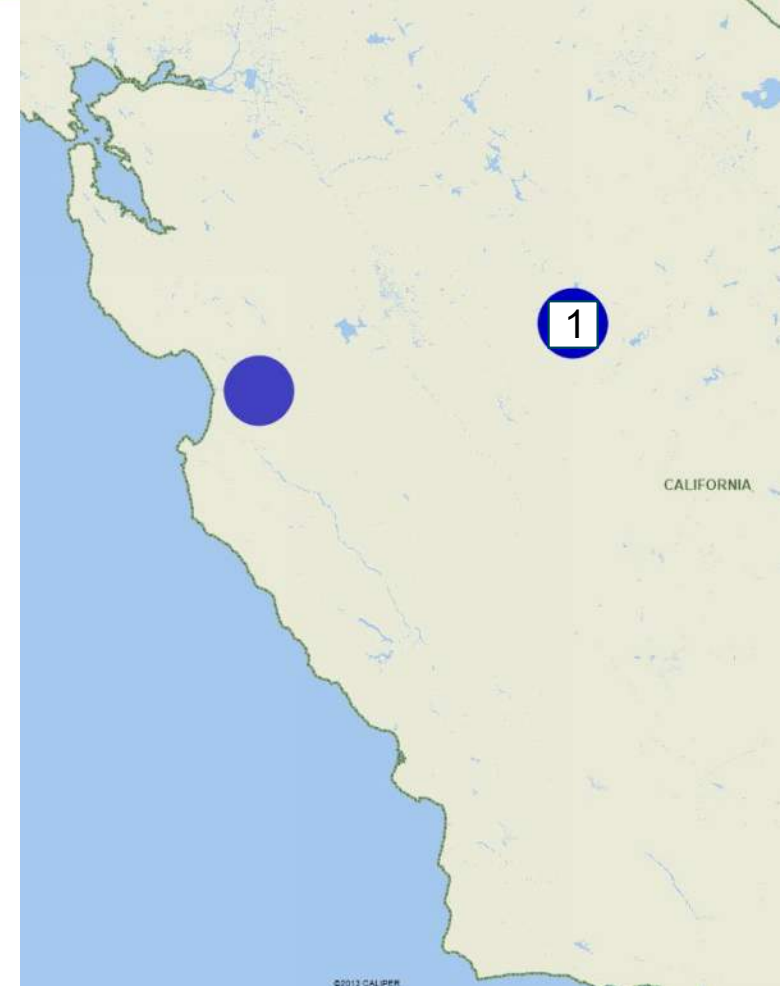
- 1,000 SFR units in a master planned community
- Suburban/rural context

Primary Analysis Tool

- Travel Demand Model

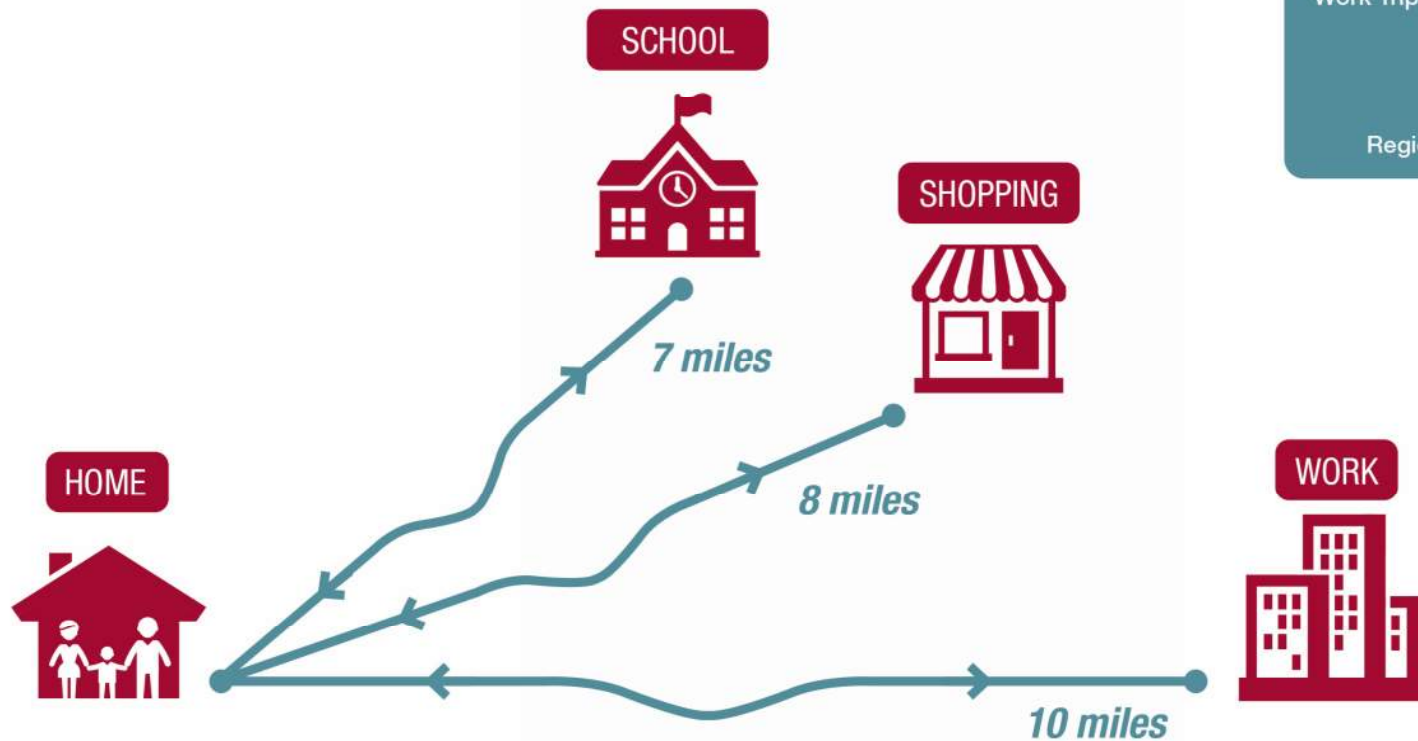
Location

- Rural Central Valley



EFFICIENCY METRIC

RESIDENTIAL VEHICLE MILES TRAVELED (VMT)



School Trip 2 trips x 7 miles = 14 VMT
Shopping Trip 2 trips x 8 miles = 16 VMT
Work Trip 2 trips x 10 miles = 20 VMT

$50 \text{ VMT} / 3 \text{ people}$
= 16.7 miles/capita

Regional per Capita Threshold = 15.5 VMT/capita

FACTS:

- Parent 1 takes child to school
- Parent 1 goes shopping
- Parent 2 goes to work
- Family has 3 persons

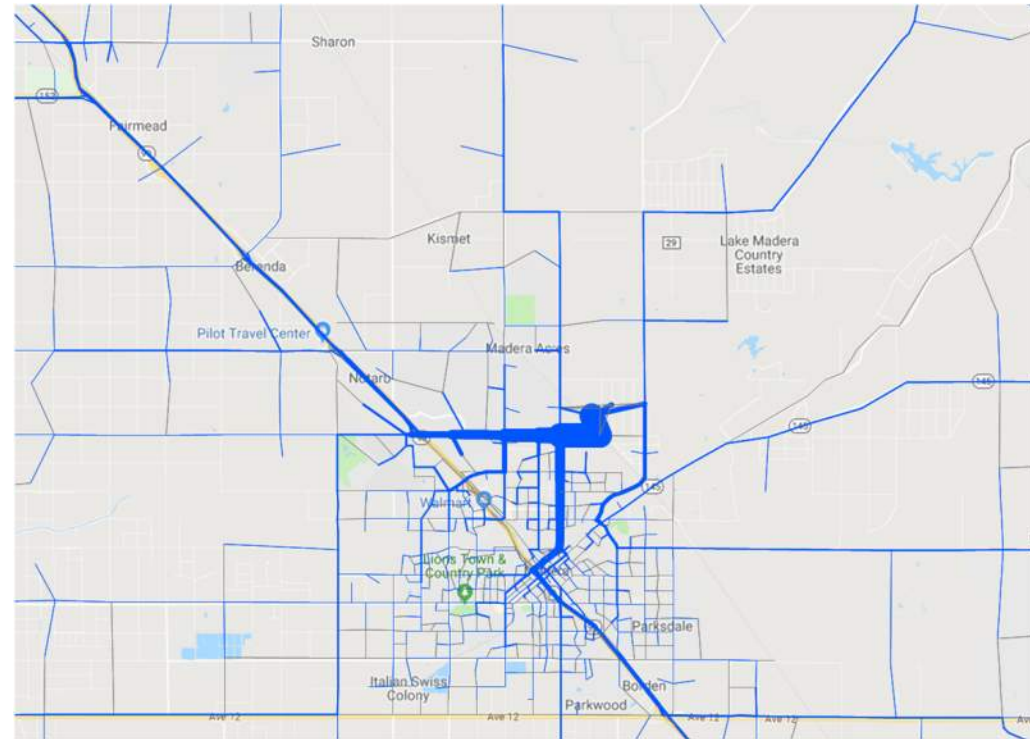
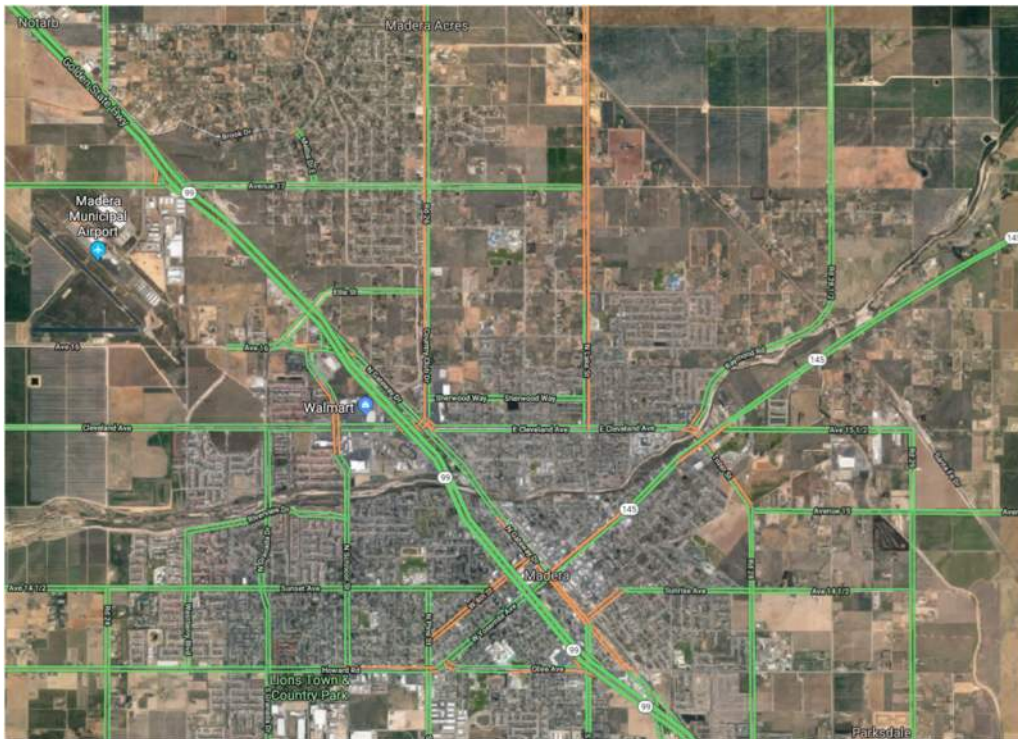
SIGNIFICANT IMPACT

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Vehicle Miles Traveled Case Studies



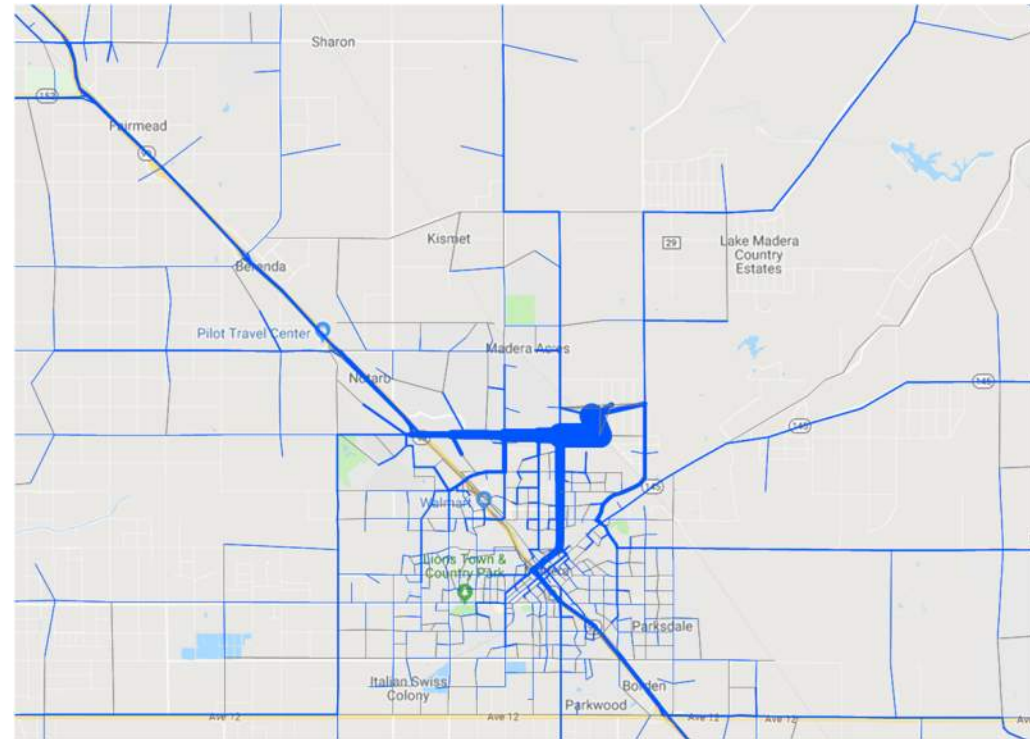
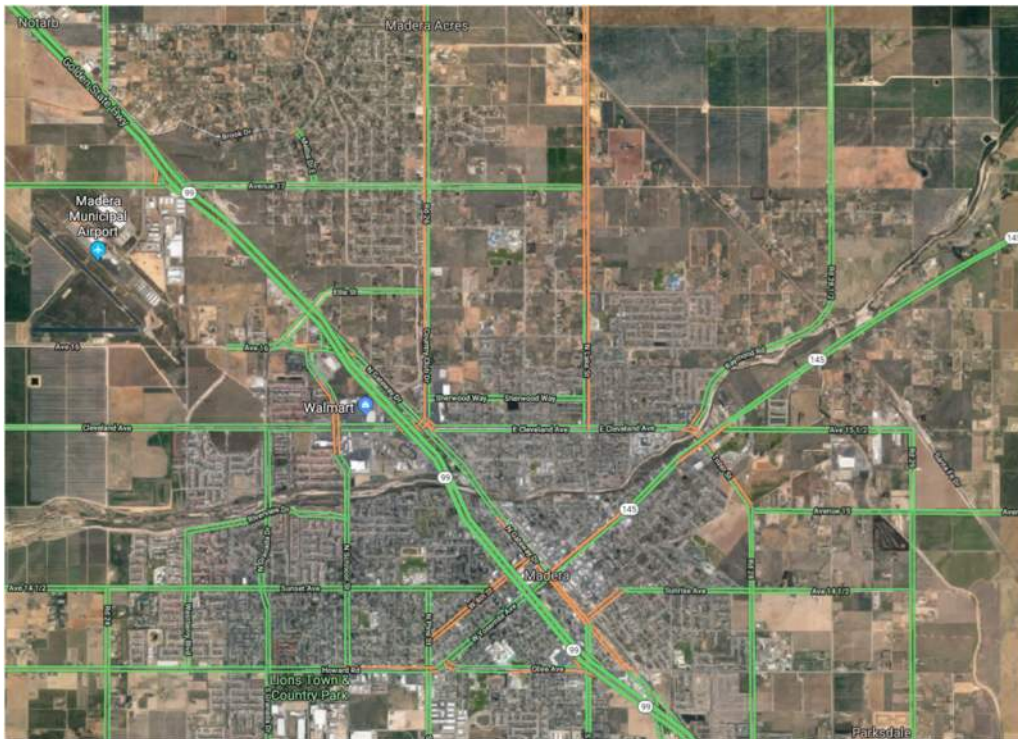
SB 743 Example #1



Vehicle Miles Traveled Case Studies



SB 743 Example #1: **VMT Impact**





SB 743 Example #2

Facts

Land Use Description

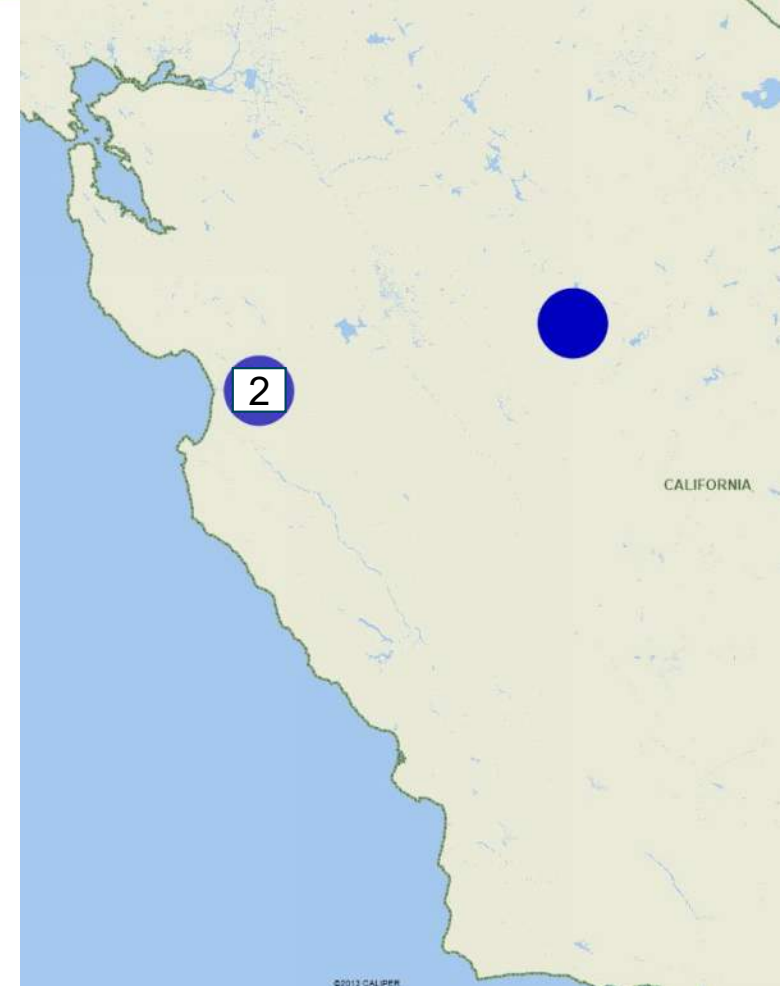
- 12,000 square foot retail store
- Urban context

Primary Analysis Tools/Methods

- Qualitative

Location

- Northern California

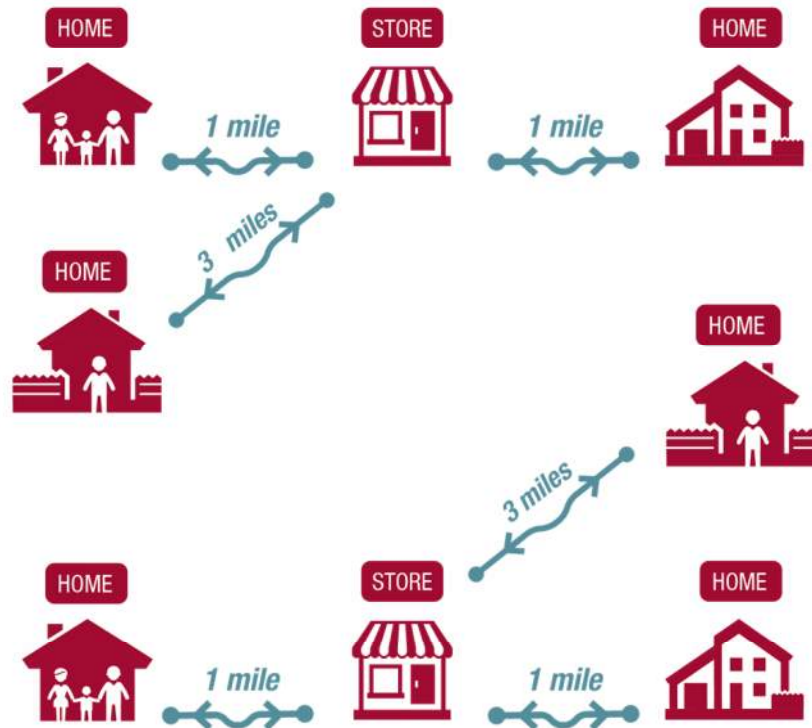


NET CHANGE METRIC

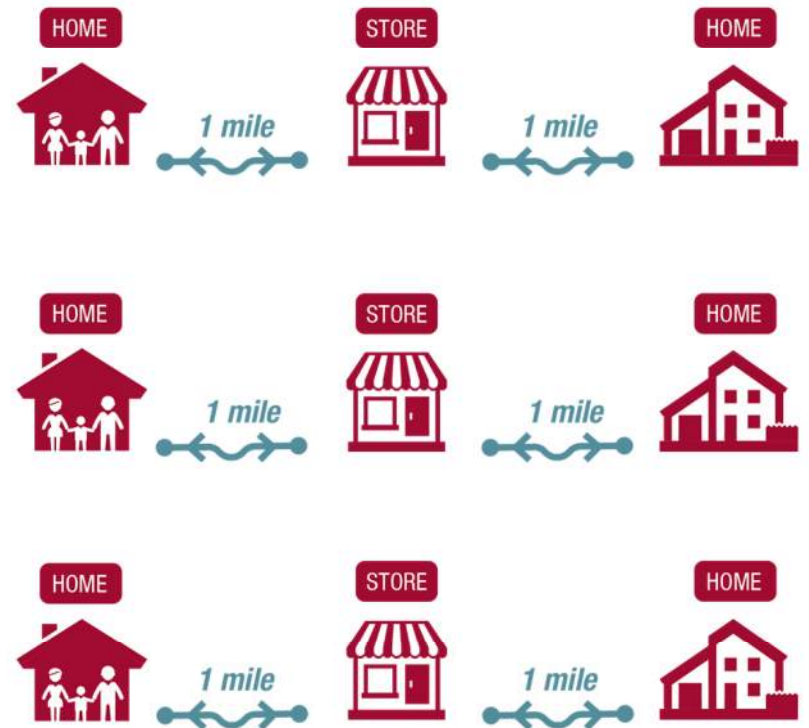
RETAIL VEHICLE MILES TRAVELED (VMT)

Regional VMT with Project = 4.999M VMT
Regional VMT w/o Project = 5.000M VMT
- 0.001M VMT

- FACTS:**
- New store added
 - Existing shoppers pick the shortest trip



REGIONAL VMT = 5.00M



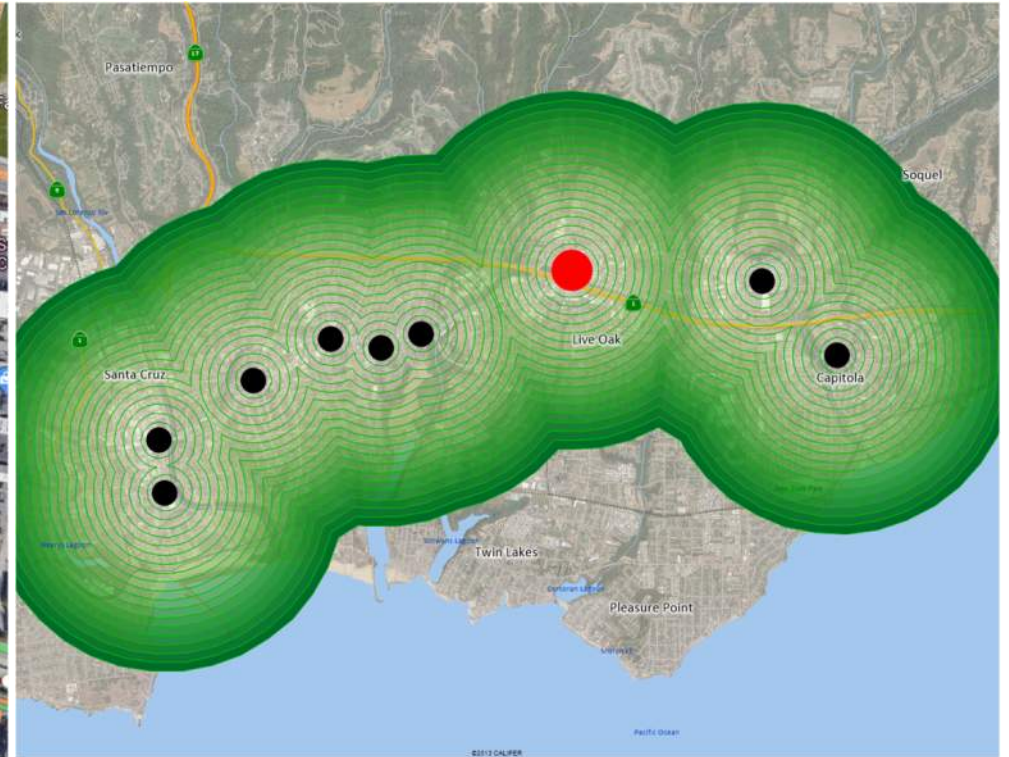
REGIONAL VMT = 4.999M

NO SIGNIFICANT IMPACT

Vehicle Miles Traveled Case Studies



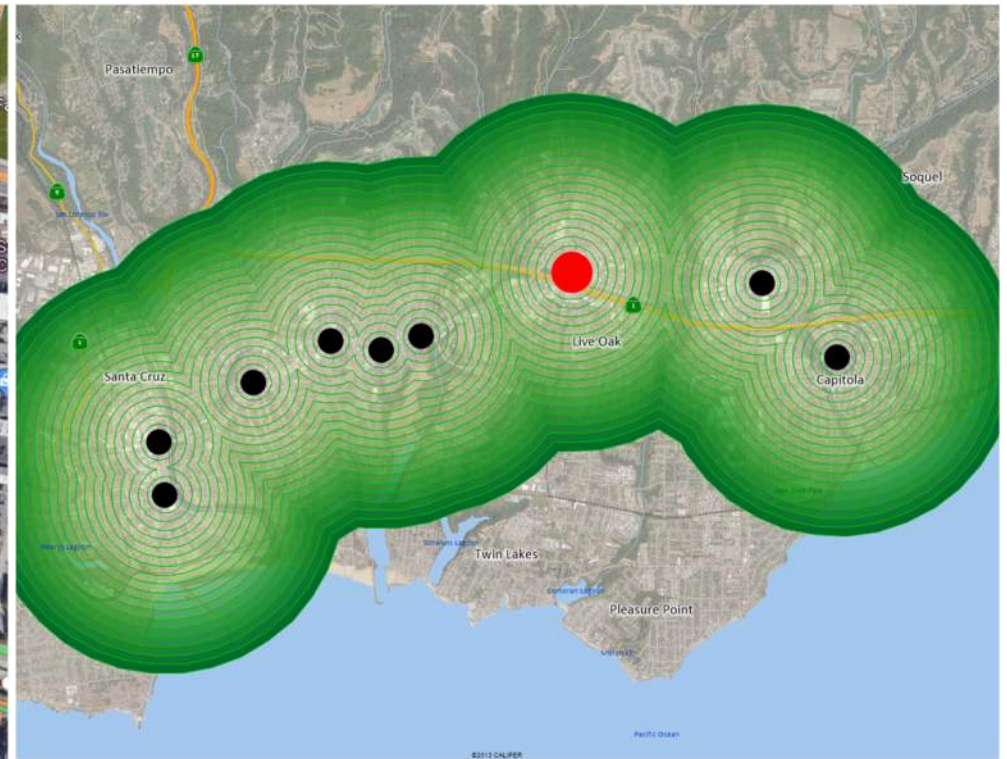
SB 743 Example #2



Vehicle Miles Traveled Case Studies



SB 743 Example #2: No VMT Impact



Vehicle Miles Traveled Case Studies



Anecdotal Results

	LOS			VMT		
	URBAN	SUBURBAN	RURAL	URBAN	SUBURBAN	RURAL
RESIDENTIAL	X	?	✓	✓	?	X
OFFICE	X	?	✓	?	?	X
RETAIL	X	?	✓	✓	✓	✓
OTHER LOCAL SERVING	X	?	✓	✓	✓	✓
ROADWAY WIDENING	✓	✓	✓	X	X	X



Analyzing Regional VMT



Changes anticipated based on transportation projects and land use policy

Changes anticipated based on TDM program investments and/or other "off-model" strategies

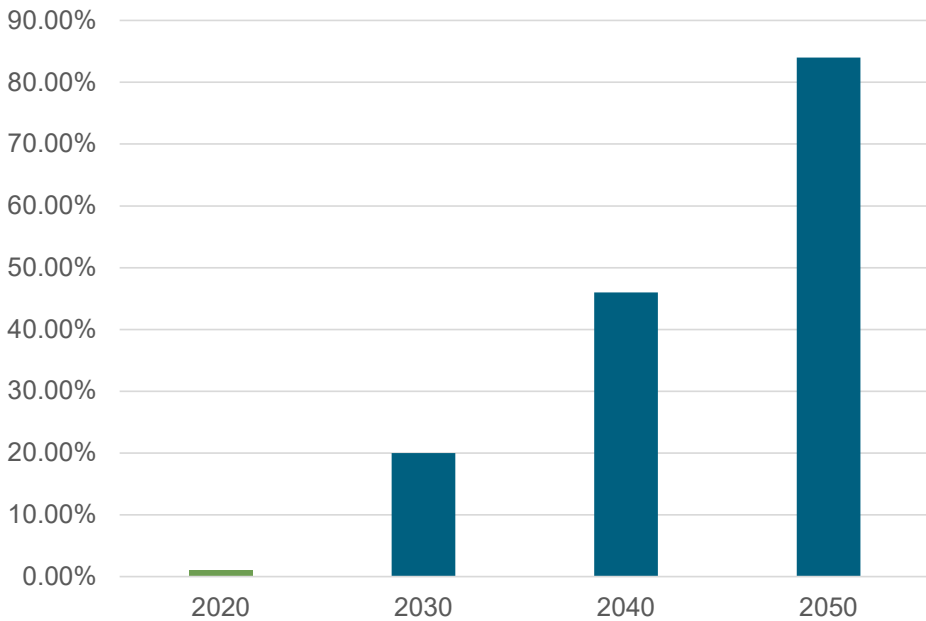
Likely future VMT impacts

Hennepin County VMT Mitigation Program

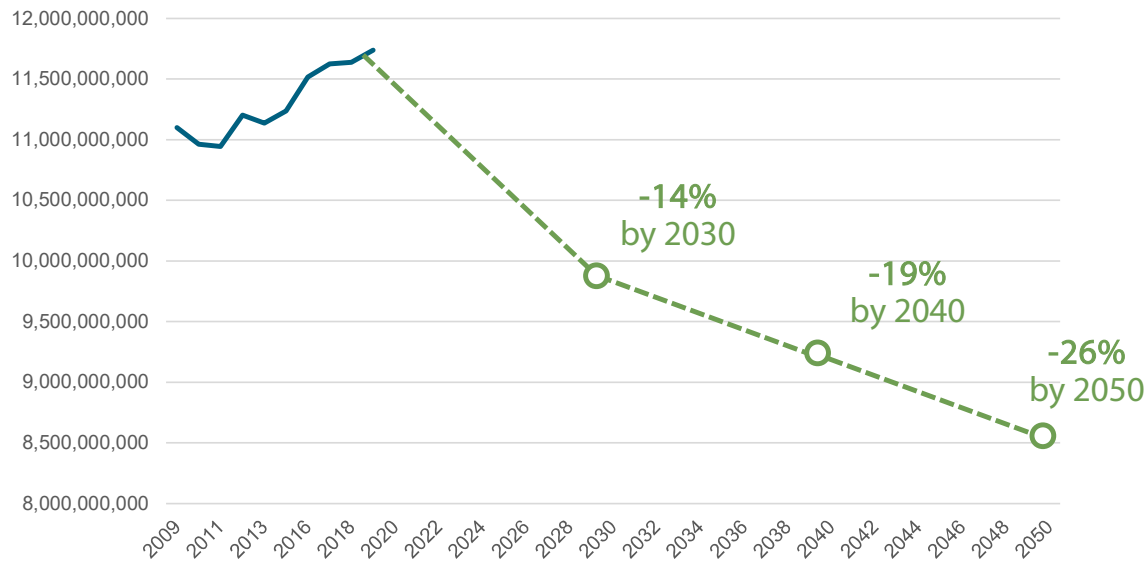
Net Zero
by 2050

One-third
of County emissions come from
the transportation sector

Percentage of light duty fleet that is EV



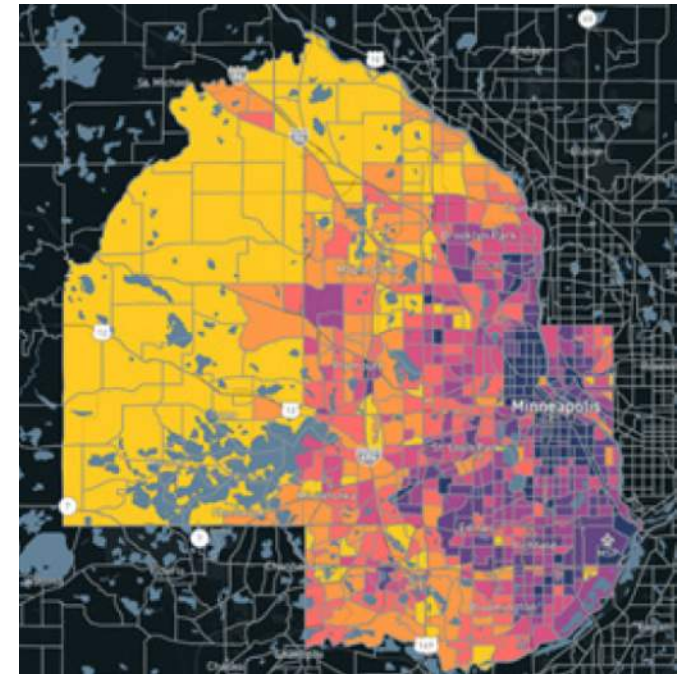
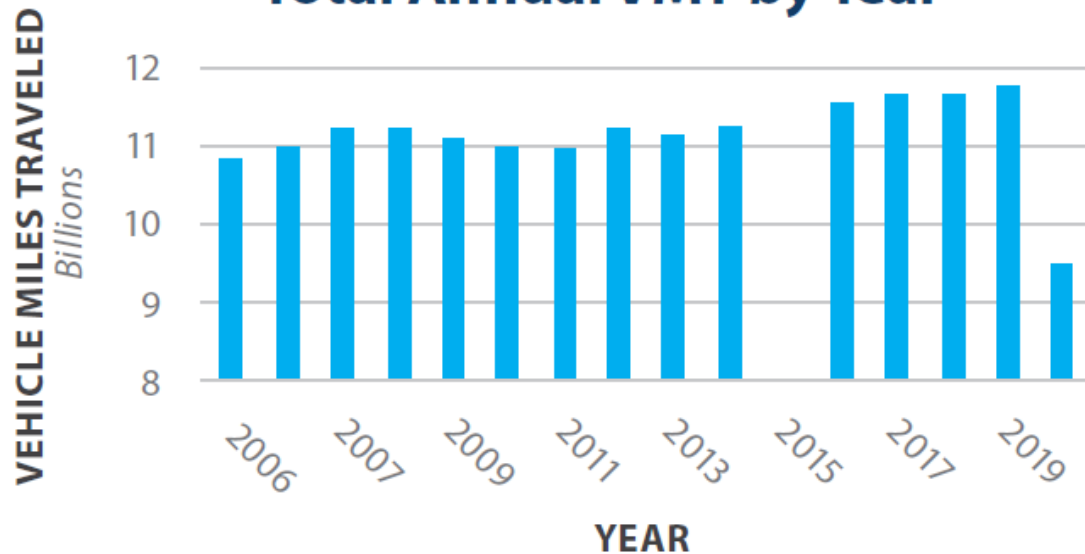
Total Annual VMT





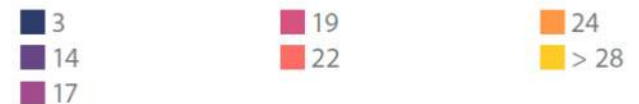
Hennepin County VMT Mitigation Program

Total Annual VMT by Year



Residential VMT

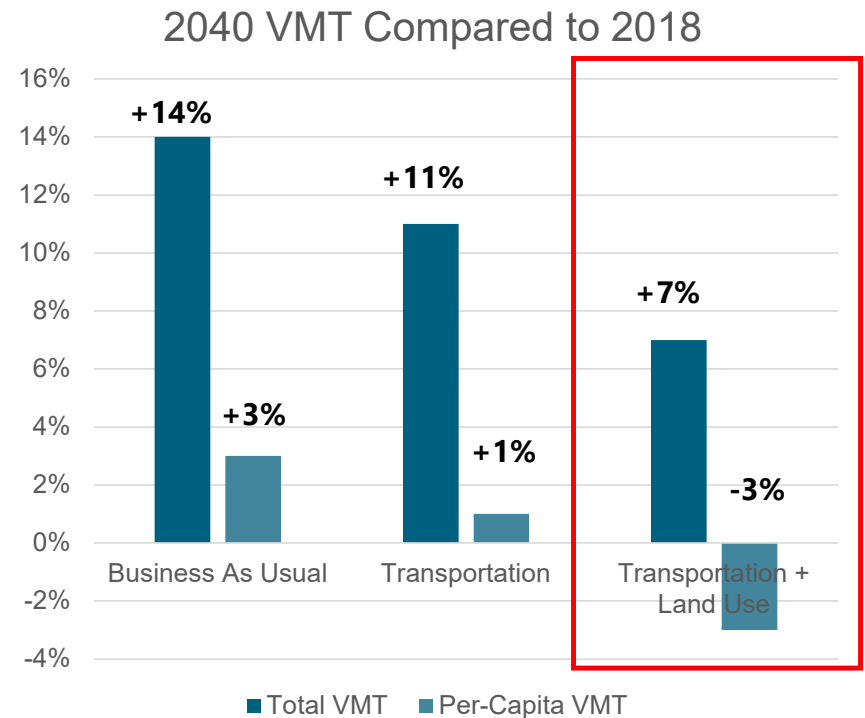
Vehicle Miles Traveled by residents living in each area





Land Use and Transportation Solutions

- Three alternatives were developed
 - Business as usual
 - Transportation focus
 - Transportation focus plus land use
- Total VMT **will** increase due to population and employment increase
- Only the *Transportation and Land Use scenario will* reduce per-capita VMT by 2040



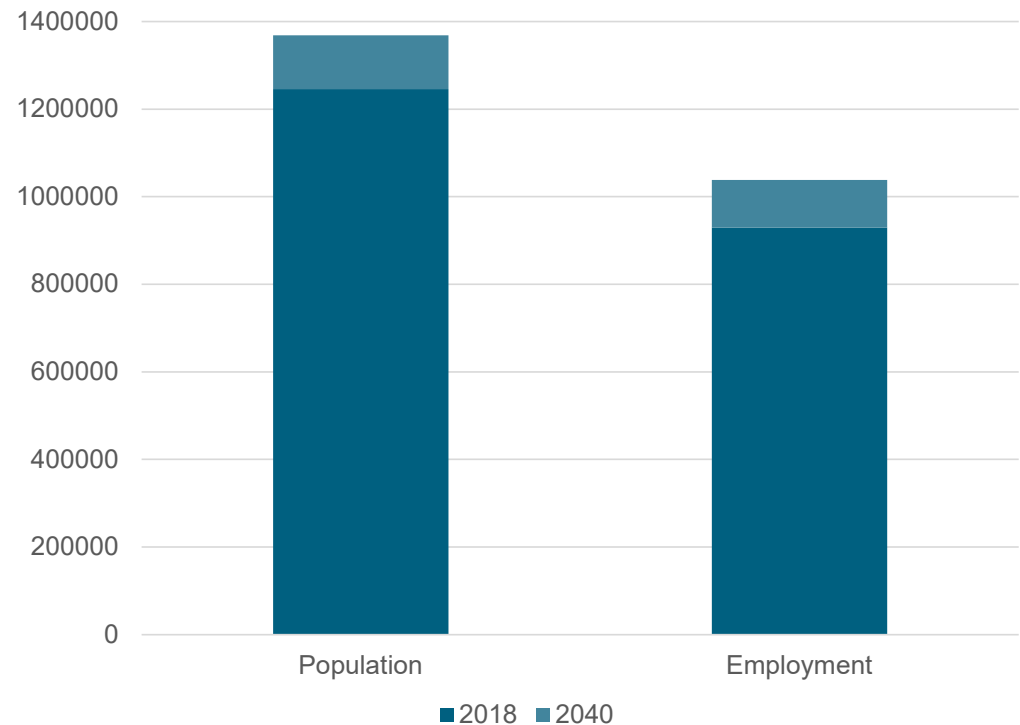


Potential Land Use Impact

New growth by 2040

- 122,000 people
- 109,000 jobs
- 79,000 households

About **10%** of total 2040 population and employment



Vehicle Miles Traveled Case Studies



Broad Range of Options



Complete Streets



Transportation Demand Measures



Bike



ITS/TSM



Transit Oriented Development



Jobs/Housing Balance



Safety



Road Diet



Park-and-Ride



Vanpool/Carpool



Pedestrian



Signal System



Affordable Housing



Toll Lanes, Cordon Pricing, and Pricing per Mile



Mobility Hub



Lane Restrictions and Traffic Calming

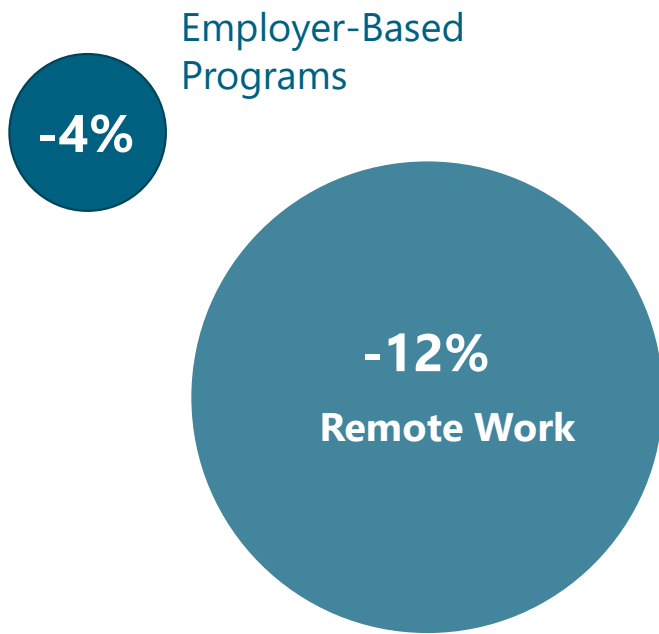


Transit

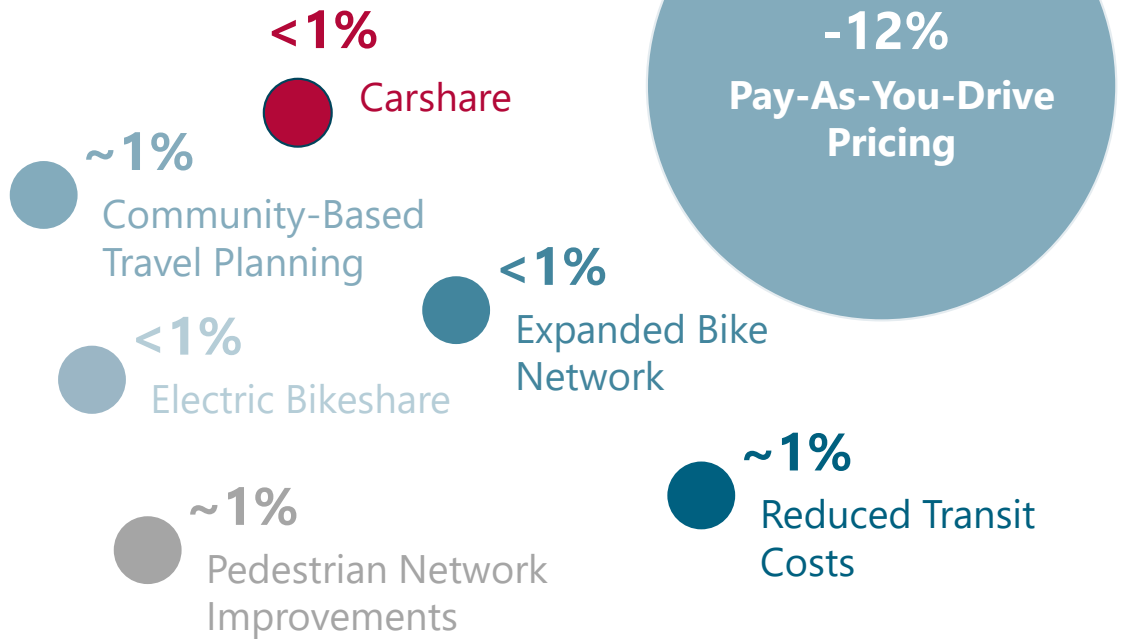


VMT Mitigation Solutions

Reduces Commute Trips



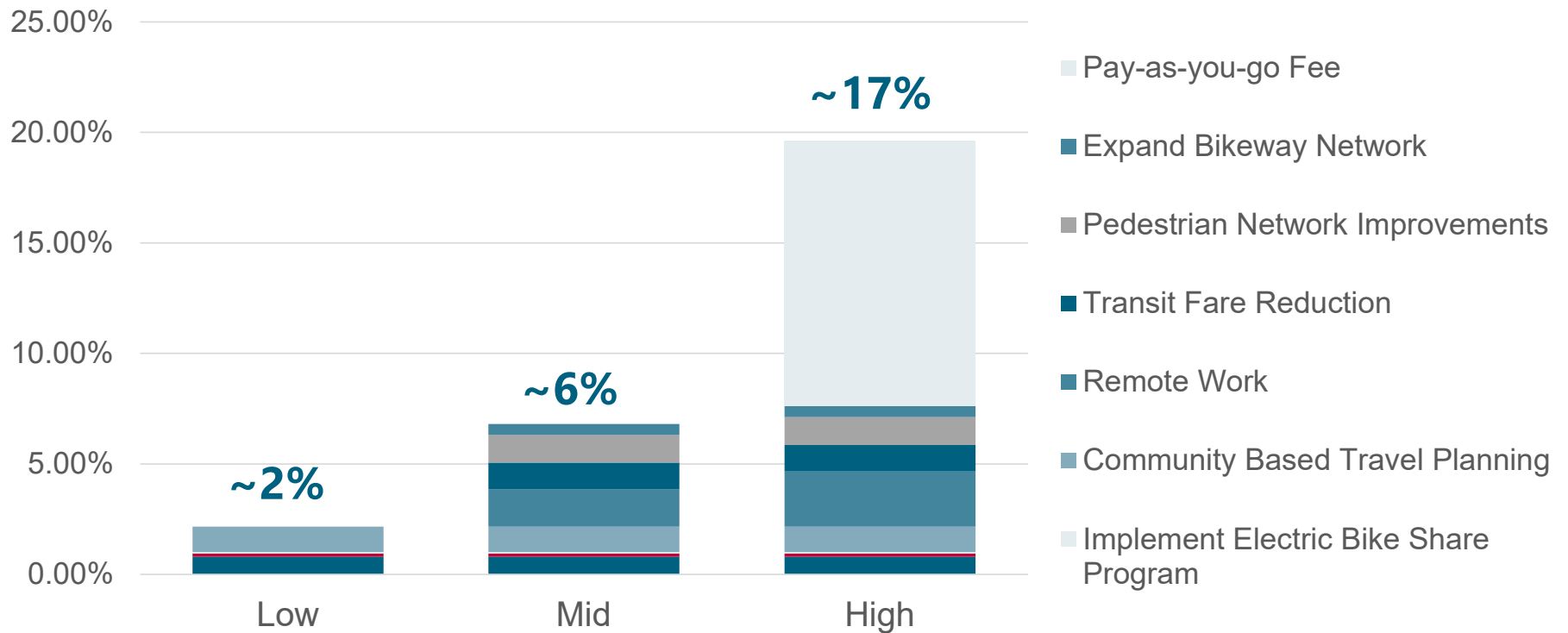
Reduces All Trips



Vehicle Miles Traveled Case Studies



Potential Per Capita VMT Reduction

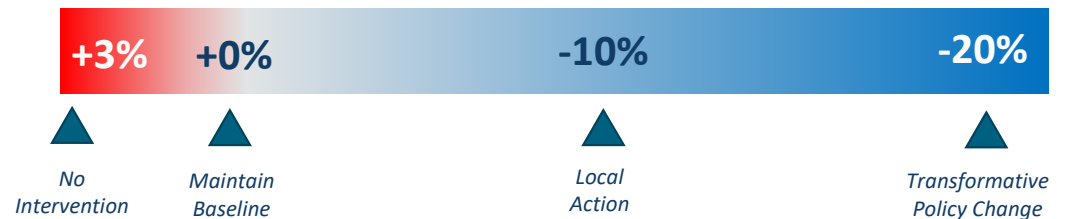




VMT Reduction Goal

- Currently defining, prioritizing, and refining strategies
- If we do nothing, per capita VMT is likely to increase by 3%
- Combining transportation and land use changes with significant TDM reductions may decrease per capita VMT by 10-20%

Potential per capita VMT change in 2040



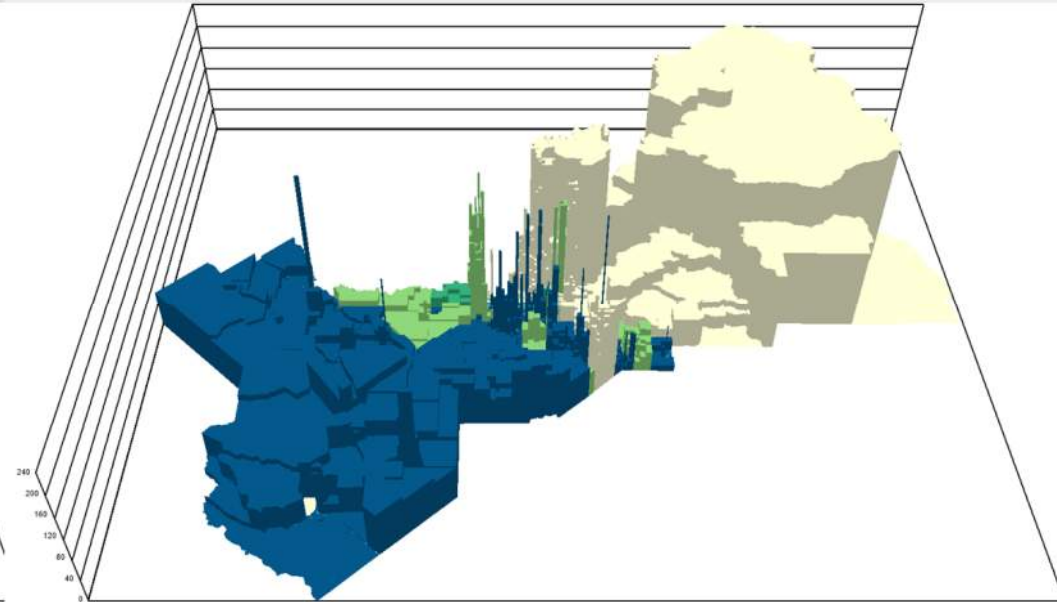
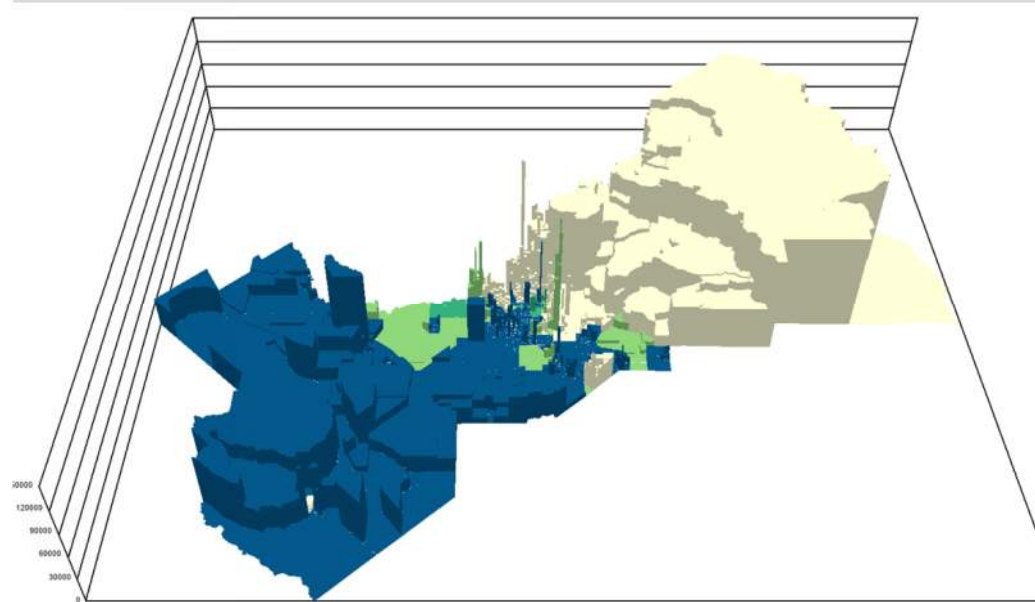
Significant VMT reduction can only be achieved through significant action, including regional and statewide partnerships



Fresno COG Regional VMT Mitigation Program

Residential

Employment

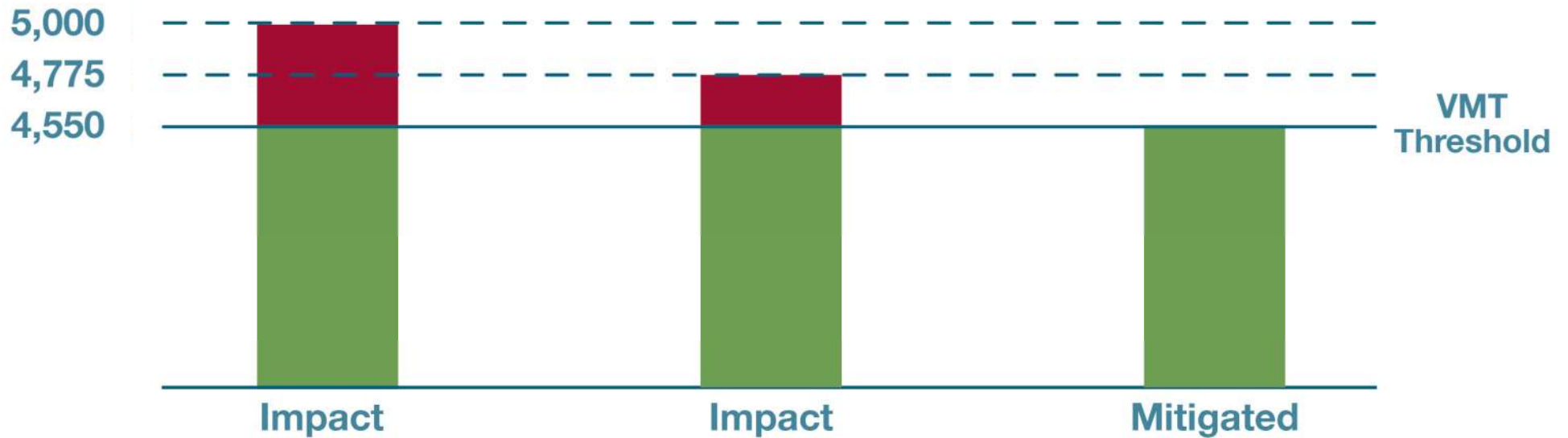


Reduction	Future Vehicle Miles Traveled (VMT) to Mitigate	
	Residential	Employment
Total VMT (2019 - 2035)	366,004	433,197
Total VMT per Year	22,875	27,075

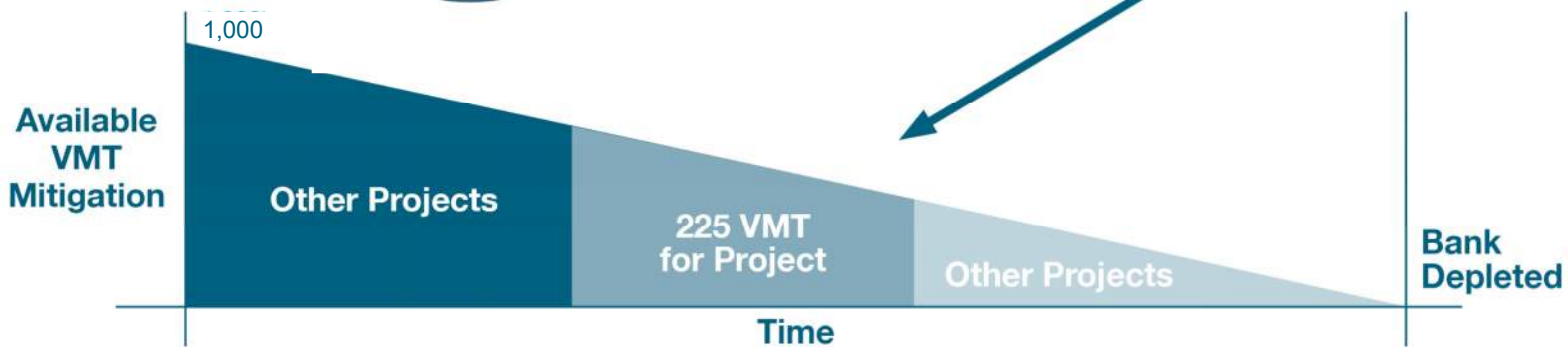
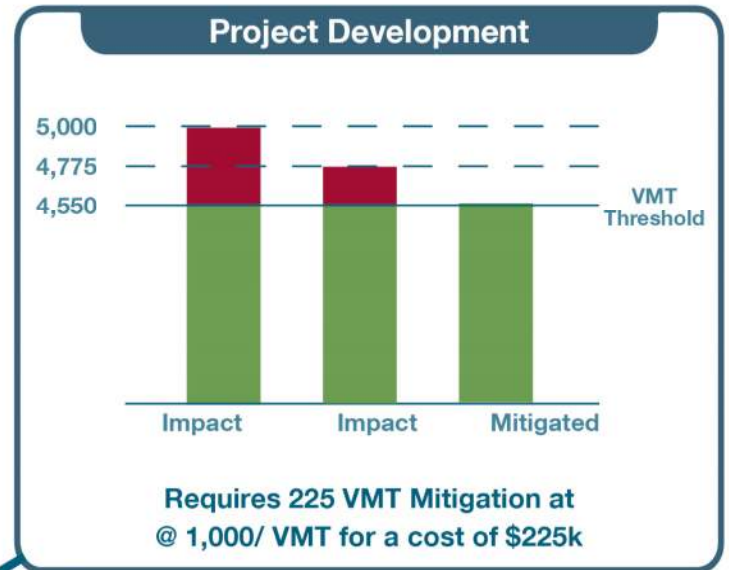
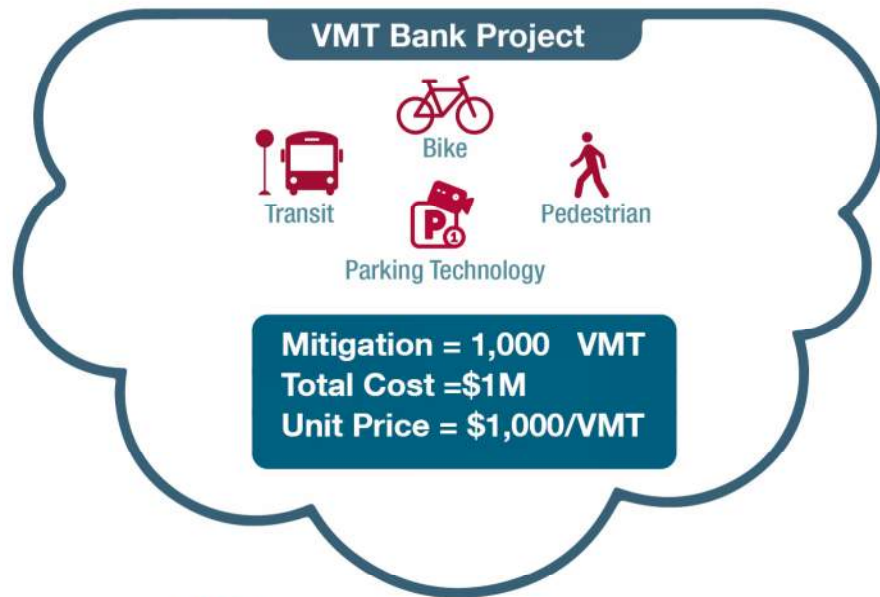
Vehicle Miles Traveled Case Studies



Example Project



How a VMT Banking Works





Induced Demand

Mitigations can be impacts

Driver behavior has demonstrated:

- Adding capacity decreases travel time
- Lowering the “price” of driving
- Prices go down, driving goes up

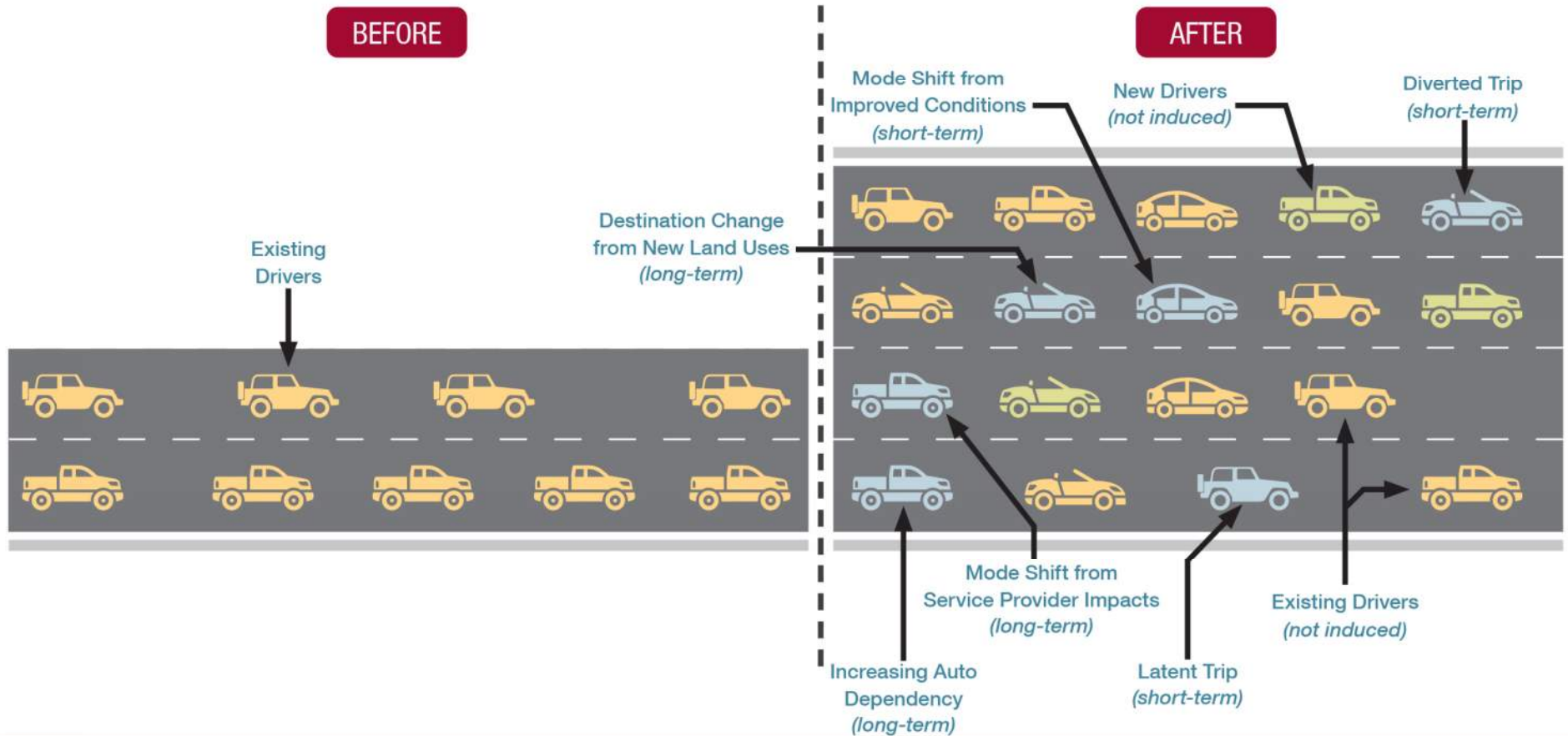
Research tells us that capacity improvements:

- Increases VMT in the short-run and long-run
- Results in new VMT
- Increases GHG emissions



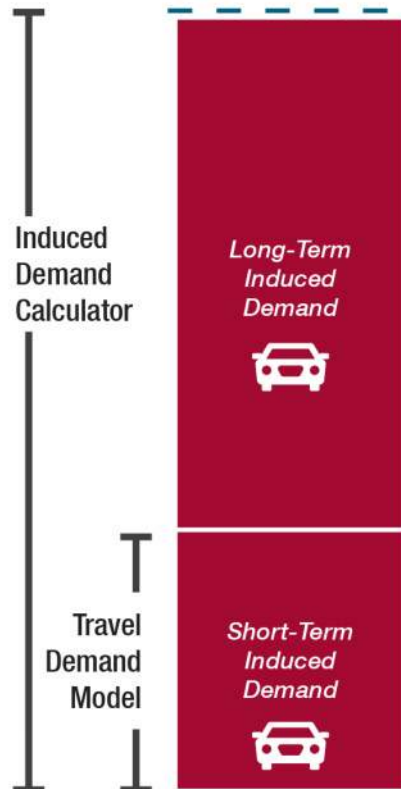
INDUCED DEMAND


WHAT IS IT?





NCST Calculator





Heavy Vehicles should be removed from induced demand which is about 24% for analysis considering SB 743 and 375 impacts.

Calculator

- Select Year
 - 2019
- Select facility type
 - Interstate highway (class 1 facility)
 - Class 2 or 3 facility
- Select county
 - Sacramento
- Input total lane miles added
 - 33.24 miles

Calculate Induced Travel

Results

96.5 million additional VMT/year
(Vehicle Miles Traveled)

In 2019, Sacramento County had 1713.3 lane miles of Caltrans-managed class 2 and 3 facilities on which 6.6 billion million vehicle miles are travelled per year.

A project adding 33.24 lane miles would induce an additional 96.5 million vehicle miles travelled per year on average with a rough 95% confidence interval of 77.2 - 115.8 million VMT (+/-20%).

This calculation is using an elasticity of 0.75

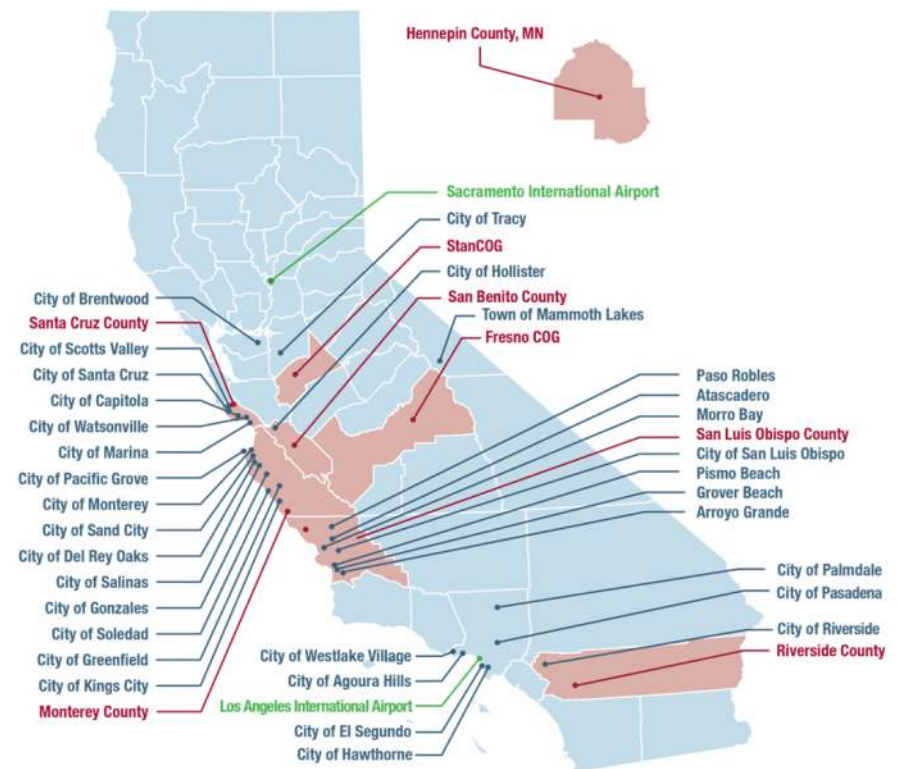
[Read more about this calculator](#)

Vehicle Miles Traveled Case Studies



Lessons Learned from California

- Invest in education
- Individualize goals
- Establish uniform methods
- Measure and report progress
- VMT reductions are often not cheap or easy
- Induced demand is a significant challenge
- Voluntary is often not effective
- Success requires rethinking current “business as usual” practices



Vehicle Miles Traveled Case Studies



Questions

