



# Transportation Broadband Strategies to Reduce VMT and GHG Emissions

Southern California Association of Governments

Magellan Advisors, LLC  
DKS Associates

Connecting The World One Community at a Time

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## Project Objectives

Determine how broadband availability impacts VMT and GHG emissions.

- Estimate how VMT and GHG emissions may be reduced as broadband is used as a substitute for travel.

Determine how integrated broadband and transportation planning can increase broadband availability.

- Identify cost and funding strategies for including broadband in transportation projects.

# Transportation System Performance

## Baseline Performance Assessment

Level of Congestion (VMT; VHT; VHD)

- Volume/Capacity Plots
- Speed Plots

Identified Non-Broadband Areas (TAZs)

Origin-Destination of Trips from Non-Broadband TAZs

- Streetlight Data from SCAG
- Home-Based Work Trips (19% of total trips)
- Average Trip Length – Approximately 6 miles

Safety

- Federal PMs

PERFORMANCE MEASURE	2016 BASELINE 5-YEAR ROLLING AVERAGE	2017 SINGLE YEAR	2021 SCAG REGIONAL TARGET*
NUMBER OF FATALITIES	1,403	1,505	1,622
FATALITY RATE (PER 100 MILLION VMT)	0.88	0.906	1.32
NUMBER OF SERIOUS INJURIES	5,044	6,386	6,672
SERIOUS INJURY RATE (PER 100 MILLION VMT)	3.162	3.843	5.45
TOTAL NUMBER OF NON-MOTORIZED FATALITIES + SERIOUS INJURIES	2,046	2,118	2,212

	VMT	VHT	VHD
PASSENGER VEHICLES	427,205,797	12,170,601	2,484,014
LIGHT TRUCKS	5,877,749	134,496	25,694
MEDIUM TRUCKS	4,345,778	100,475	18,443
HEAVY TRUCKS	20,960,500	409,955	68,076
<b>TOTAL</b>	<b>458,389,824</b>	<b>12,815,527</b>	<b>2,596,227</b>



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# Broadband Expansion Market Assessment

Pre-screening at the block group level

- Census table B28011 “Internet Subscriptions in Household”
- If Block Group < 50 percent of households: Non-Broadband-0
- If Block Group > 50 percent of households: Broadband-1
- Aggregate Block Groups to the TAZ level
- If TAZ < 50 percent of households: Non-Broadband-0
- If TAZ > 50 percent of households: Broadband-1

Total households: 441,712 (5.8% of Total HH in 2045)

Non-broadband TAZs have significantly higher proportion of low-income households.

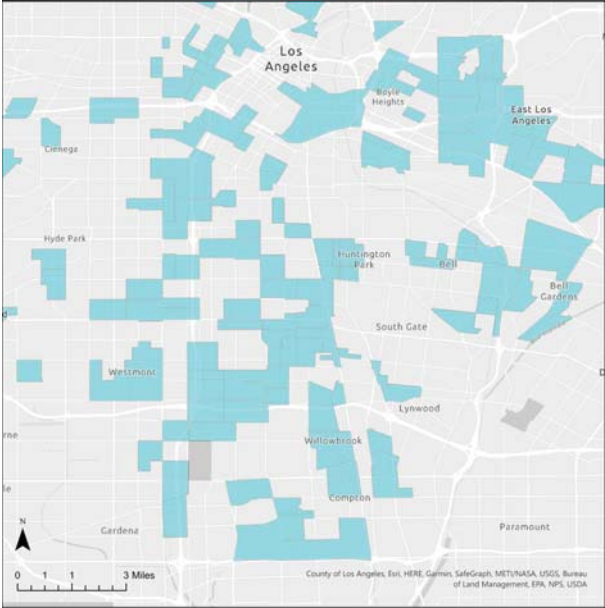


Broadband Adoption Ratio  
0.00000 - 0.50000

SCAG Region  
Regionwide

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SCAG Region  
South LA/Long Beach

# Broadband Expansion Market Assessment

Essential versus Non-essential Workers

- NAICS Code
- 387 Sub-Sectors

Major Sector	Percent Essential
Agriculture	100%
Construction	100%
Manufacturing	92%
Wholesale Trade	70%
Retail Trade	70%
Transportation and Warehousing	100%
Information	88%
Finance Insurance Real Estate	66%
Professional Scientific and Technical	52%
Education	83%
Arts Entertainment Recreation	59%
Other Service	57%
Public Administration	60%



SCAG Region  
San Bernardino

# Broadband Scenarios

Shelter in Place Behavior

- Streetlight Data & PeMS Data.
- Shelter-In-Place Orders (closing and reopening periods) during the COVID-19 pandemic. AM / PM Peak Period.
- HBW origin-destination volumes between the Non-Broadband TAZs and all other zones.
- Passenger Vehicles Only

Upper Bound Behavior

- Non-Essential Workers (NAICS Analysis)
- Non-Broadband TAZs and Broadband TAZs
- Passenger Vehicles Only



# Broadband Scenarios: 2045

- A. Future Baseline - Pre-Pandemic Travel Behavior – SCAG Connect SoCal (RTP/SCS) Preferred Scenario
- B. Non-Broadband Expansion Increment – Shelter in Place Behavior: Modified SCAG O-D Trip Matrix
- C. Non-Broadband Expansion Increment - Upper Bound Behavior: Modified SCAG O-D Trip Matrix
- D. Total Broadband - Upper Bound Behavior (Regionwide): Modified SCAG O-D Trip Matrix

- Vehicle Miles of Travel (Regionwide)
- Vehicle Hours of Travel (Regionwide)
- Volume Difference Plots of SCAG Network



SCAG Region  
San Bernardino

# Analysis of Broadband Impacts on VMT and GHG

SCENARIO	TOTAL VMT LDA/LDT	PERCENT CHANGE OF TOTAL VMT	CO2 (TONS PER DAY)	PERCENT CHANGE OF TOTAL CO2
A: 2045 BASELINE	459,090,327	-	164,369	-
B: 2045 NBEI-SIPB	454,523,915	-1.00%	163,009	-0.89%
C: 2045 NBEI-UBB	451,795,887	-1.61%	162,185	-1.43%
D: 2045 TB-UBB	400,444,110	-14.65%	148,397	-11.48%

Broadband Expansion (Scenario B and C): Isolates Increment

- Daily VMT reductions between 4.6 million to 7.3 million (1 - 2 %) CO<sub>2</sub>
- Reduction between 1,360 – 2,184 tons/day (1 – 1.5%)

Total Region (Scenario D): All Non-Essential Workers Telecommute

- Daily VMT reductions up to 59 million (15 % reduction)
- CO<sub>2</sub> Reduction of up to 15,972 tons/day (11.5% reduction)

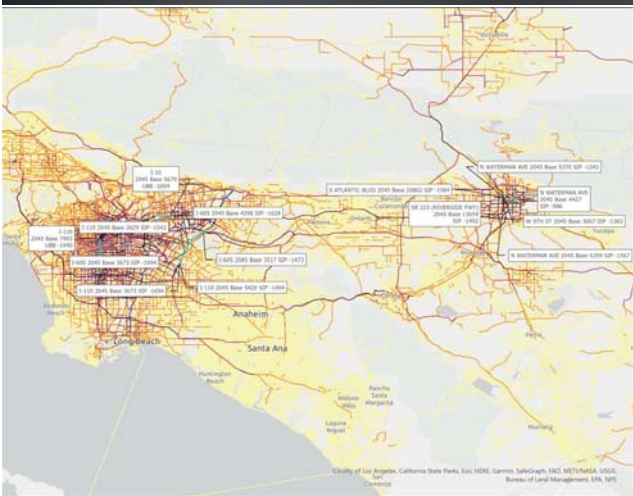
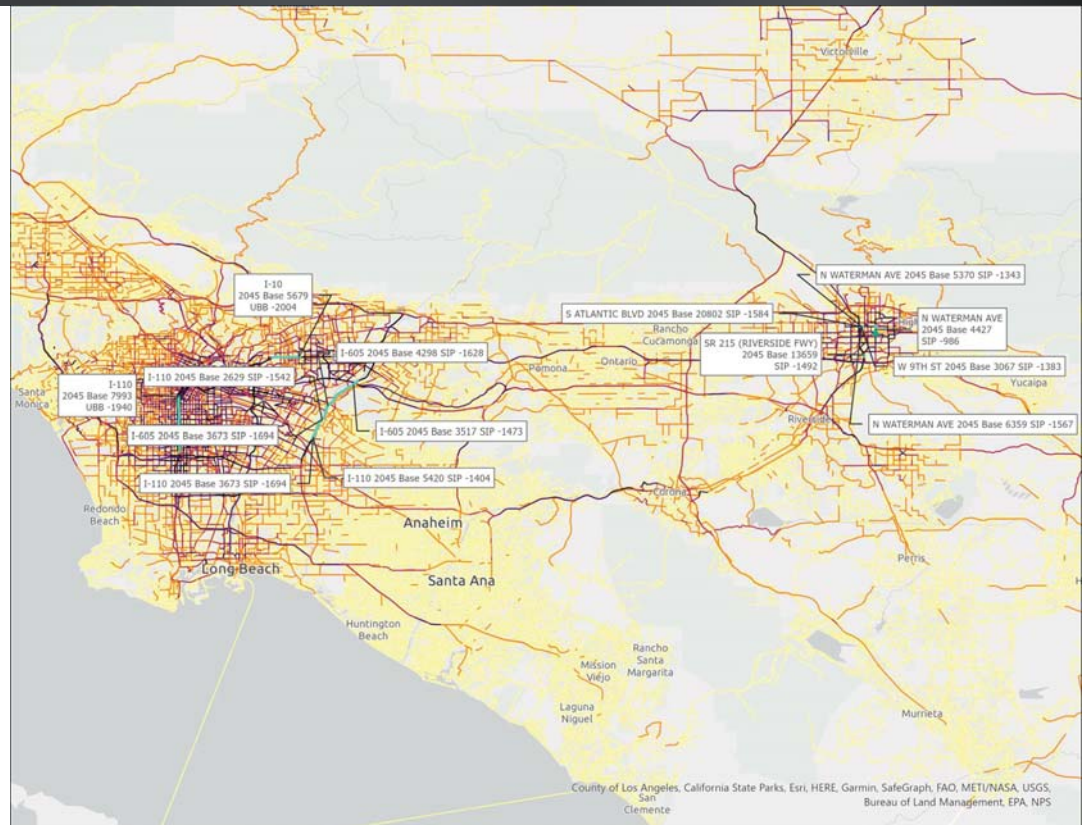


SCAG Region  
Imperial/Riverside

# Volume Difference Plots

AM/PM Peak Hour Roadway Volumes (Scenario B or C) relative to Connect SoCal RTP/SCS (Scenario A).

Most heavily utilized roadways (shown as green) that serve non-broadband areas (i.e., TAZs)



## Analysis of Broadband Impacts on VMT and GHG

Most Benefiting Roadways from Broadband Expansion to Non-Broadband Areas:

- I-10
- I-110
- I-605
- I-710
- SR 215
- SR 91
- SR 72
- SR 42
- North Waterman
- South Atlantic Blvd
- Riverside Dr
- East 7<sup>th</sup> St
- Figueroa St
- West 120<sup>th</sup> St

# For Further Study

## Refine Definition of Non-Broadband Areas

- Access / Adoption / Speed
- Apply Continuous Scale vs. Binary
- Finer spatial granularity

## Include Additional Trip Purposes and Other Time Periods (Non-Peak Periods)

- Tele-Shopping
- Tele-Health

## Reflect Current Academic Research

- UC Davis Research
- USC Research

## Analyze Additional Scenario (E) Total Broadband – Shelter-In-Place Behavior

- Anticipated Benefit: Between 2 – 15 % VMT and GHG Emission Reduction
- Connect SoCal (2024 RTP/SCS Update) - contribute to SCAG Region's GHG Emission Targets