

Appendix E: Plan Performance

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Section 1: Federal Performance Management Targets

Transportation agencies rely on both observed and forecasted data to support planning and investment decisions. In 2012, the federal government enacted the Moving Ahead for Progress in the 21st Century Act (MAP-21), which placed increased emphasis on performance-based planning for both state and regional governments. The federal requirements hold state departments of transportation (e.g., Caltrans) and MPOs accountable for setting performance targets that will ensure transportation dollars are being used effectively and efficiently. Caltrans is required to set and report on progress towards three sets of annual performance measurement targets:

Safety Performance Management (PM1): Fatalities and Injuries

Pavement and Bridge Condition Performance Management (PM2): Infrastructure Conditions

System Performance Management (PM3): Freight movement, congestion, and reliability

This appendix describes each federal performance metric, charts data collected to date, compares that data to currently adopted targets and describes how the 2025 Blueprint makes investments that support reaching those targets. For some targets, Metropolitan Planning Organizations (MPOs) can either agree to support the state target or establish a numerical target specific to the MPO planning area. Since this federal process started in 2018, SACOG has supported all of Caltrans statewide targets for all three sets of performance metrics. Below are summary tables of SACOG supported state targets for each performance metric.

TABLE 1-1 - SAFETY PERFORMANCE MANAGEMENT (PM1): FATALITIES AND INJURIES

		5-year Rolling Average Targets with annual percent reductions							
	Data Source	2018	2019	2020	2021	2022	2023	2024	2025
Number of Fatalities	FARS	3590.8	3445.4	3518	3624.8	3491.8	3808.2	4080	4048.6
		7.69%	3.00%	3.03%	2.90%	-3.61%	-0.30%		
Rate of Fatalities (per 100 million VMT)	FARS & HPMS	1.029	0.995	1.023	1.044	1.042	1.216	1.300	1.260
		7.69%	3.00%	3.03%	2.90%	-2.00%	-1.70%		
Number of Serious Injuries	SWITRS	12823	12688	13740	15419	16704	15156	16628	16631
		1.50%	1.50%	1.50%	1.30%	1.66%	-2.30%		
Rate of Serious Injuries (per 100 million VMT)	SWITRS & HPMS	3.831	3.661	3.994	4.423	4.879	4.904	4.918	4.77
		1.50%	1.50%	1.50%	1.30%	1.66%	-2.30%		
Number of Non-Motorized Fatalities and Non-Motorized Severe Injuries	FARS & SWITRS	4271.1	3949.8	4147.4	4340.8	4684.4	4131.7	4380.5	4373.3

**TABLE 1-2 - PAVEMENT AND BRIDGE CONDITION PERFORMANCE MANAGEMENT (PM2):
INFRASTRUCTURE CONDITIONS**

Condition Target	2-year and 4-year targets			
	2019	2021	2023	2025
Interstate Target - Good	45.1%	44.5%	47.2%	49.2%
Interstate Target - Poor	3.5%	3.8%	1.9%	1.7%
Non-interstate Target - Good	28.2%	29.9%	21.7%	28.2%
Non-interstate Target - Poor	7.3%	7.2%	10.5%	9.0%
Bridges on the NHS - Good	69.1%	70.5%	49.1%	47.3%
Bridges on the NHS - Poor	4.6%	4.4%	5.9%	4.4%

**TABLE 1-3 - SYSTEM PERFORMANCE MANAGEMENT (PM3): FREIGHT MOVEMENT, CONGESTION, AND
RELIABILITY**

Travel Time Reliability and Excessive Delay	2019	2-year and 4-year targets		
		2021	2023	2025
Percent of Reliable Person-Miles Traveled on the Interstate[1]	65.1%	65.6%	74.3%	74.8%
Percent of Reliable Person-Miles Traveled on the Non-interstate NHS[1]		74.0%	84.2%	84.7%
Percentage of Interstate System Mileage Providing Reliable Truck Travel Time [Truck Travel Time Reliability Index[1]]	1.68	1.67	1.6	1.6
Annual Hours of Peak-Hour Excessive Delay Per Capita (PHED), Sacramento Urbanized Area (UA) [1]		14.7	9.0	9.0
Total Emissions Reductions by Applicable Pollutants under the CMAQ Program[2]				
VOC (kg/day)	961	971	2,862	5,724
CO (kg/day)	6,932	7,001	12,798	25,596
NOx (kg/day)	1,771	1,788	4,317	8,635
PM10 (kg/day)	2,456	2,480	2,152	4,305
PM2.5 (kg/day)	913	922	1,830	3,659
Percent of Non-single Occupancy Vehicle (SOV) Travel, Sacramento UA[3]	23.3%	23.8%	35.1%	35.1%

[1] National Performance Management Research Data Set (NPMRDS) Analytics Tool
<https://nprmrd.ritis.org/analytics>

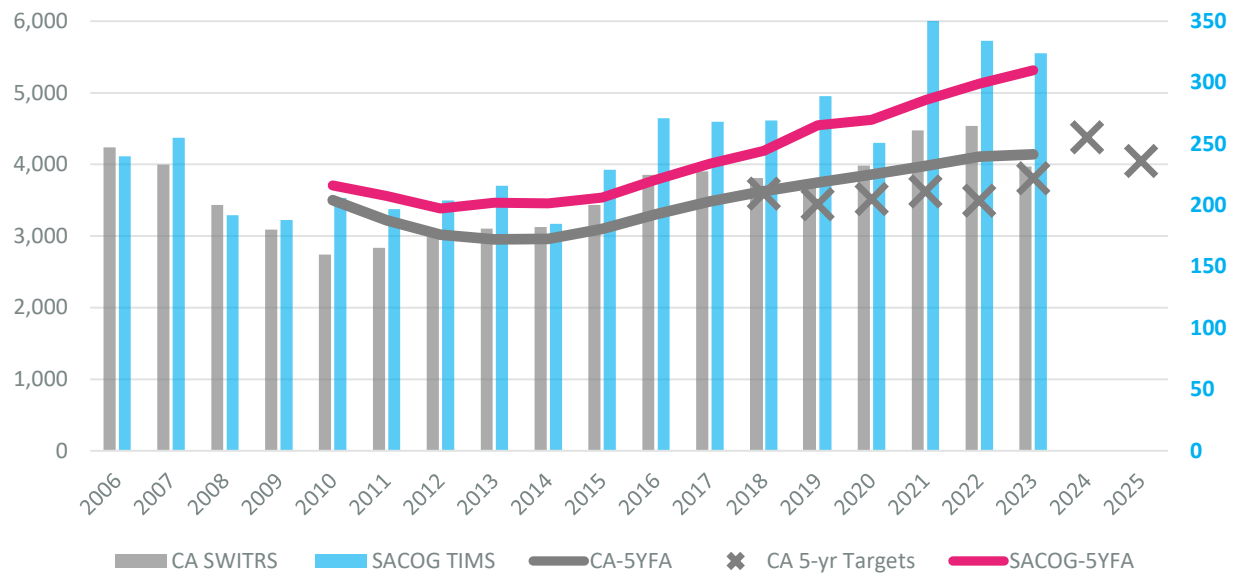
[2] CMAQ Public Access System (https://fhwaapps.fhwa.dot.gov/cmaq_pub/)

[3] U.S. Census Bureau, 2019-2025 American Community Survey 5-Year Estimates

Safety Performance Management (PM1: Fatalities and Injuries)

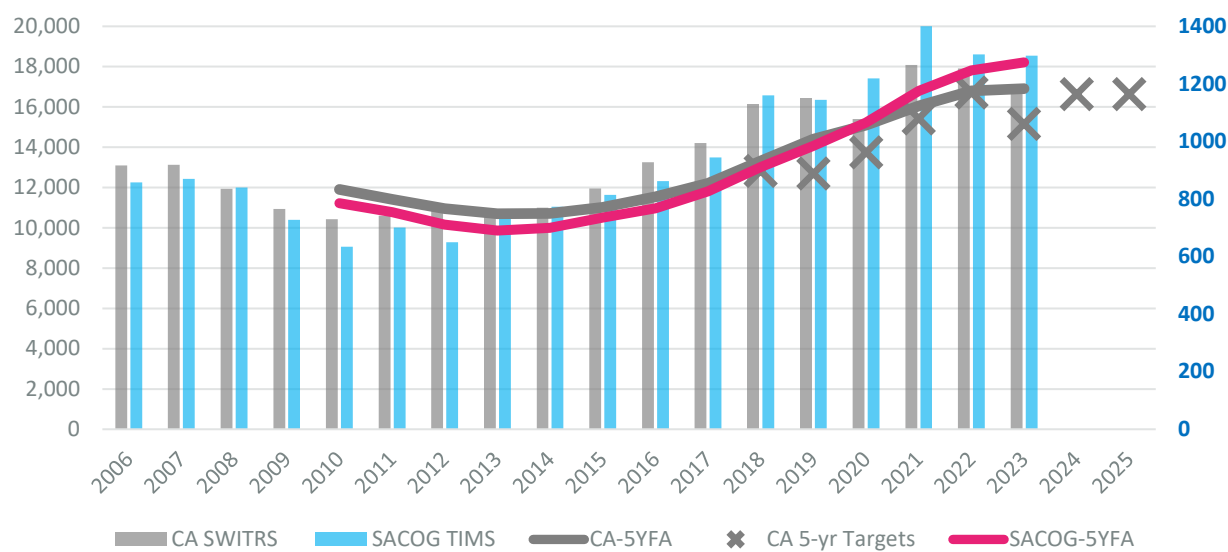
As our economy recovers from the Great Recession and COVID-19 and vehicle travel increases, more people are likely to be seriously injured or die from vehicle collisions. Since 2015, 287 people died on average each year in vehicle collisions on our region's roads and highways.¹ In 2023, as shown in Figure 1-1, 324 people died in vehicle collisions, almost a 20% increase from 2016. Figure 1-2 shows that serious injuries have followed a similar trend in recent years.

FIGURE 1-1 - 2006 – 2023 FATAL COLLISIONS: STATE VS SACRAMENTO REGION



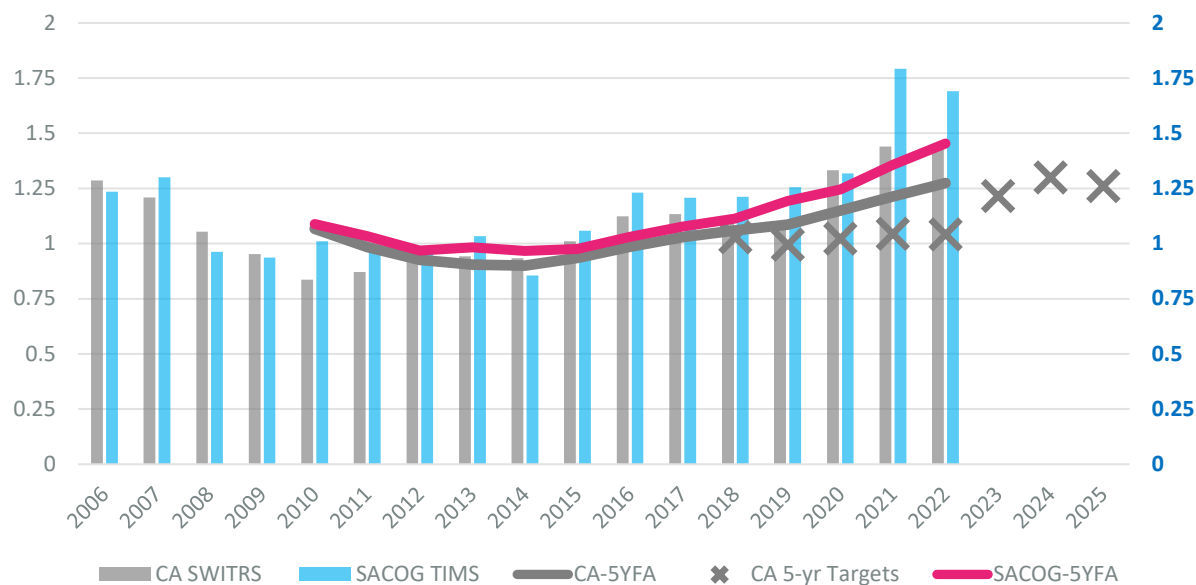
¹ UC Berkeley Safe Transportation Research and Education Center (SafeTREC) into the Transportation Injury Mapping System (TIMS). TIMS data for SACOG area fatalities use SWITRS data instead of FARS, due to spatial boundaries.

FIGURE 1-2 - 2006 - 2023 SERIOUS INJURY COLLISIONS: STATE VS SACRAMENTO REGION



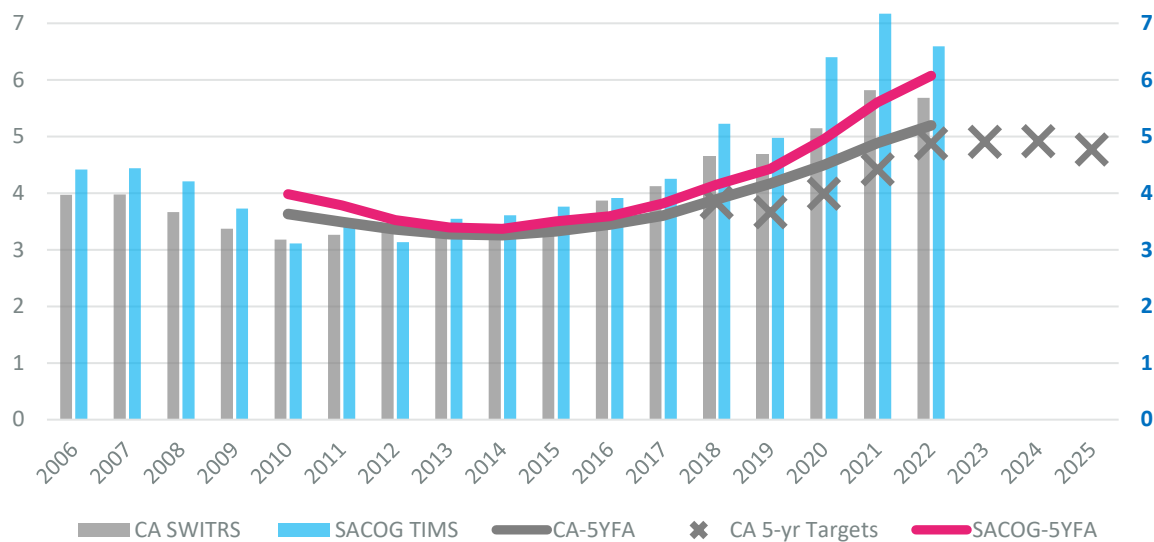
The region's 2021 collision fatality rate of 1.79 fatalities per 100 million vehicle miles traveled (MVMT) was the highest rate recorded in over 15 years, as shown in Figure 1-3.² This is much higher than the 2021 statewide average of 1.44 fatalities per MVMT. Similarly for serious injuries, a record 7.2 injuries per 100 million vehicle miles traveled (MVMT) was recorded compared to the state's 5.8 injuries per MVMT, as shown in Figure 1-4.

FIGURE 1-3 - 2006 - 2022 FATALITIES/100 MVMT: STATE VS SACRAMENTO REGION



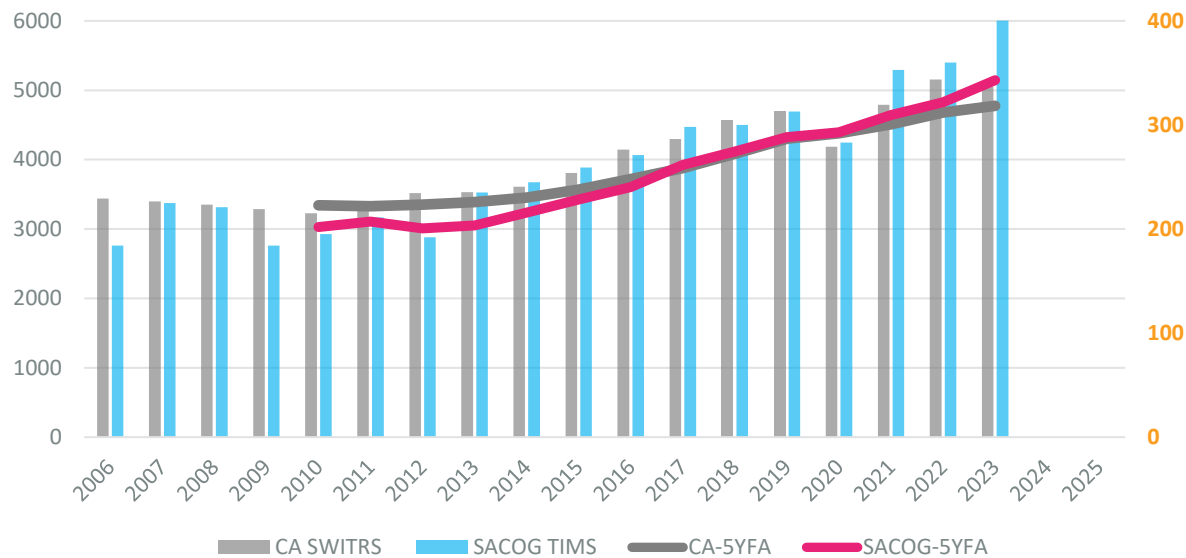
² UC Berkeley Safe Transportation Research and Education Center (SafeTREC) into the Transportation Injury Mapping System (TIMS). TIMS data for SACOG area fatalities use SWITRS data instead of FARS, due to spatial boundaries.

FIGURE 1-4 - 2006 - 2022 SERIOUS INJURIES/100 MVMT: STATE VS SACRAMENTO REGION



The region's non-motorized fatalities and serious injuries trend closely with state figures. Both show increasing collisions as post-pandemic travel ramps up, as seen in Figure 1-5.³

FIGURE 1-5 - 2006 - 2023 TOTAL NON-MOTORIZED FATALITIES AND SERIOUS INJURIES: STATE VS SACRAMENTO REGION

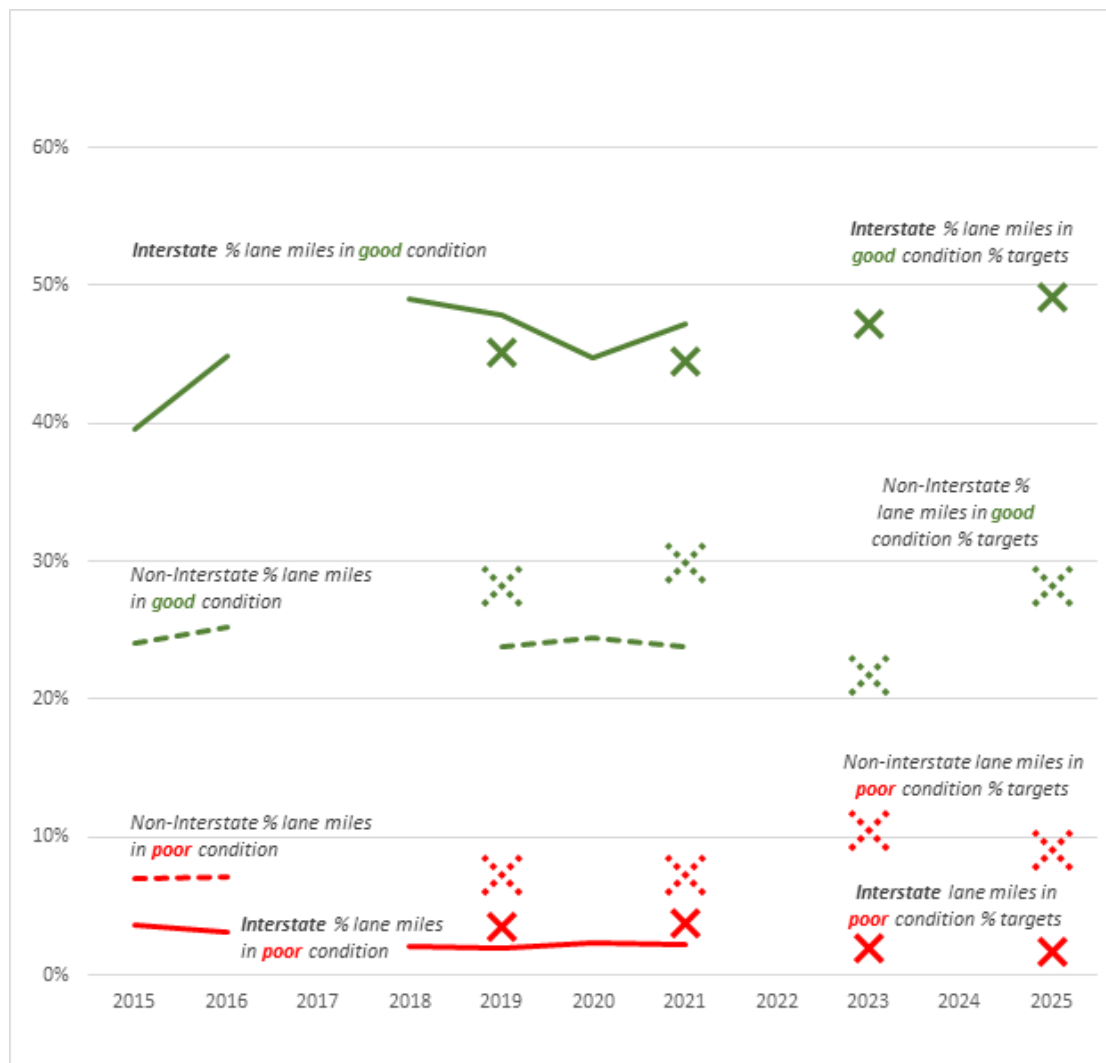


³ UC Berkeley Safe Transportation Research and Education Center [SafeTREC] into the Transportation Injury Mapping System [TIMS]. TIMS charts for SACOG area fatalities use SWITRS data instead of FARS, due to spatial boundaries.

Pavement and Bridge Condition Performance Management [PM2: Infrastructure Conditions]

Regularly maintaining our transportation infrastructure is critical to reducing long-term costs for pavement and bridge rehabilitation. The statewide targets for infrastructure condition supported by SACOG include the following 2-year and 4-year targets to maintain interstate, non-interstate and bridges on the National Highway System (NHS) by a percentage of maintained lane miles as shown below. ⁴

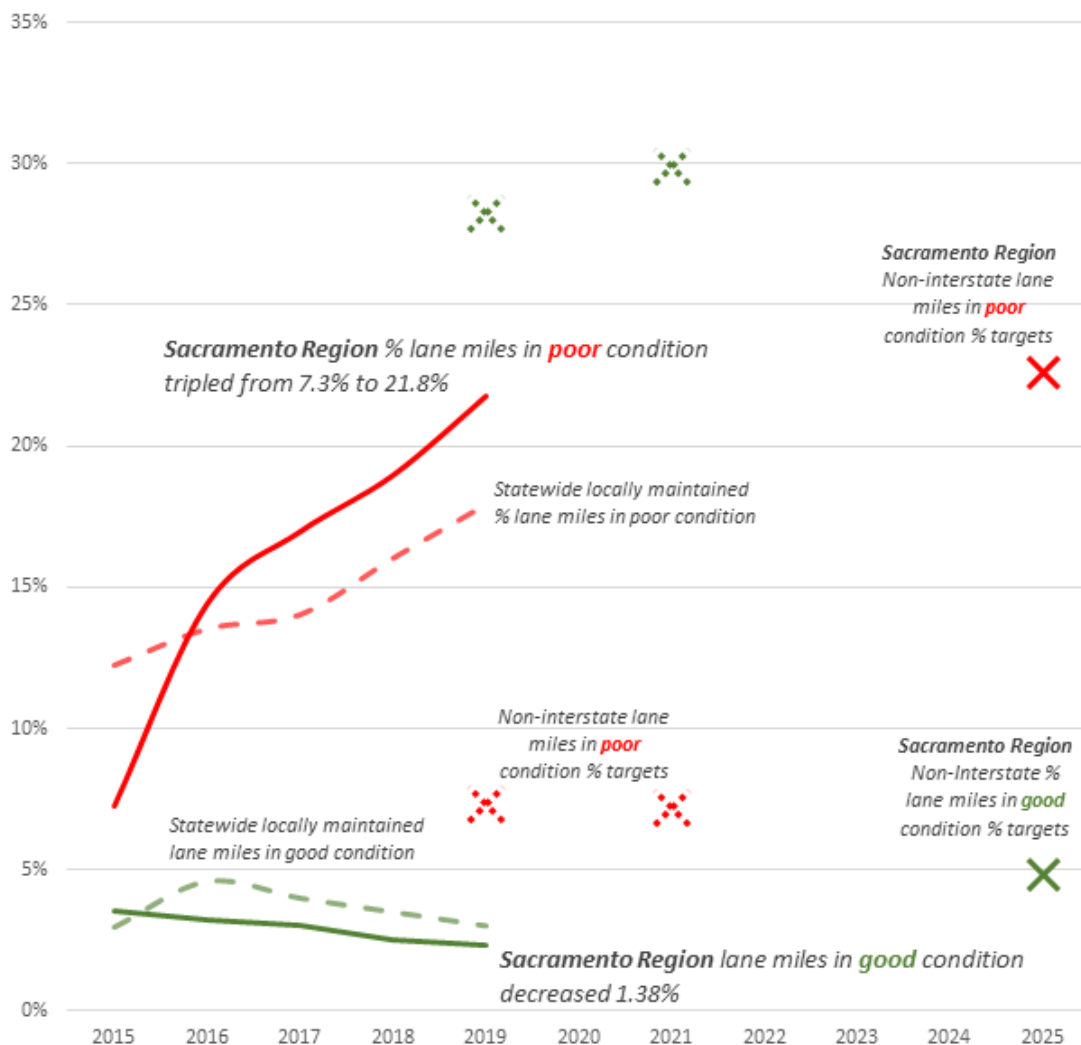
FIGURE 1-6 - 2015 AND 2021 STATEWIDE NHS INTERSTATE AND NON-INTERSTATE, PERCENT OF PAVEMENT LANE MILES IN GOOD AND POOR CONDITIONS WITH 2023 TWO-YEAR TARGETS AND 2025 FOUR-YEAR TARGETS



⁴ Highway Performance Monitoring System (HPMS) Data

Caltrans NHS data shows that Caltrans made progress increasing State-maintained interstate pavement in “Good” condition and decreasing pavement in “Fair” or “Poor” condition. A slight decrease in the percentage of non-interstate lane miles with good pavement conditions. Locally maintained NHS pavement remains mostly in Fair condition without much progress made.

FIGURE 1-7 - 2015 AND 2019 LOCALLY MAINTAINED NHS NON-INTERSTATE PERCENT OF PAVEMENT LANE MILES, STATEWIDE VS SACRAMENTO REGION, WITH 2019 TWO-YEAR TARGETS AND 2021 FOUR-YEAR TARGETS

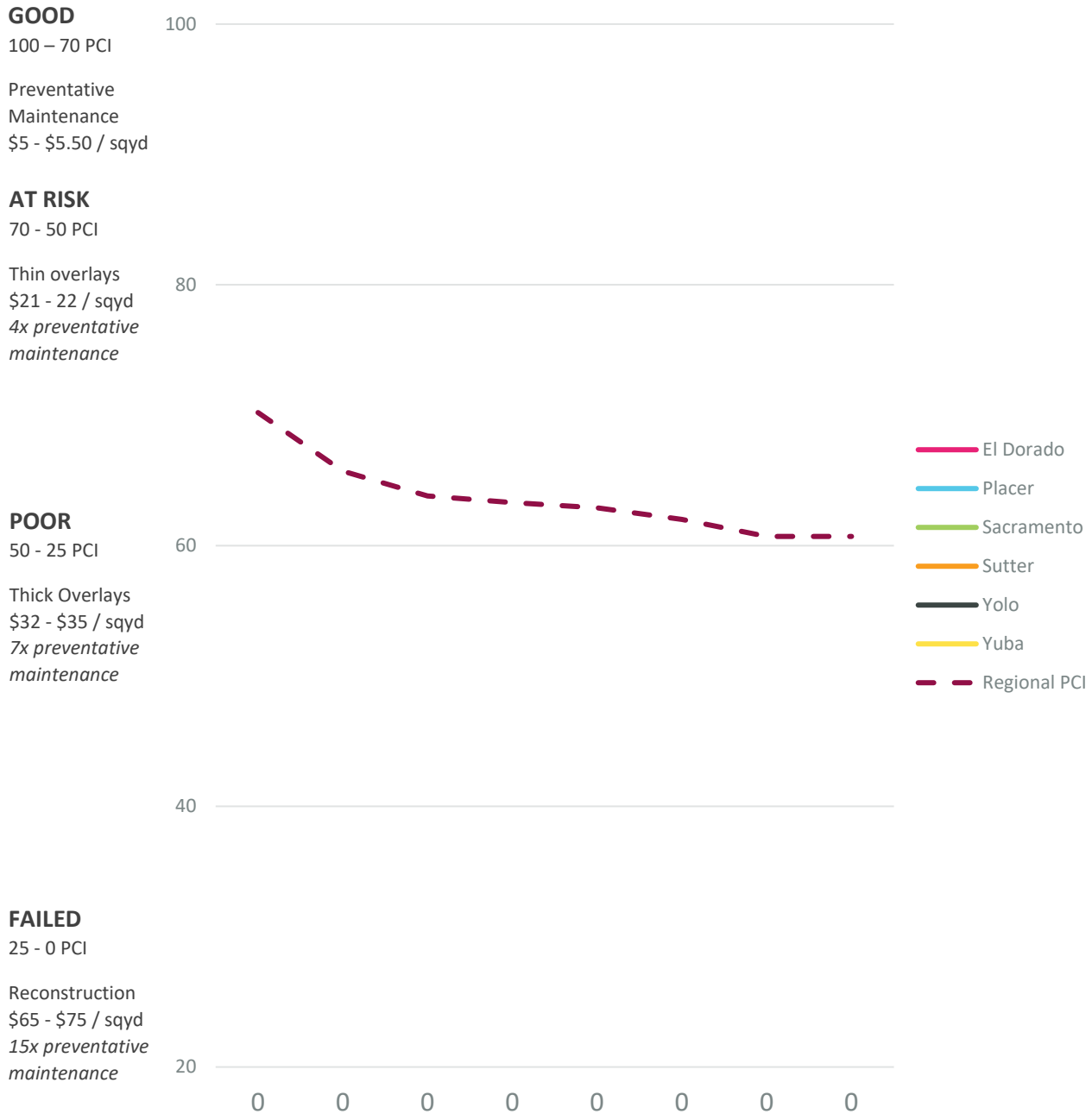


Our region’s 1,149 lane miles of locally maintained NHS, mostly principal arterials feeding onto highways, is also mostly in “Fair” condition. However, this pavement is deteriorating rapidly, where 14.6% of pavement in “Good” or “Fair” condition became “Poor” over the course of four years.

The last 15 years of California Local Streets and Roads reports for our region show that countywide pavement conditions have largely fallen, except for the El Dorado County agency. Additionally, Placer and Yuba County

agencies saw an improvement in Pavement Condition Index (PCI) in recent years.⁵ The region has managed to prevent average PCI's from falling into Poor or Failed conditions as shown in Figure 1-8.

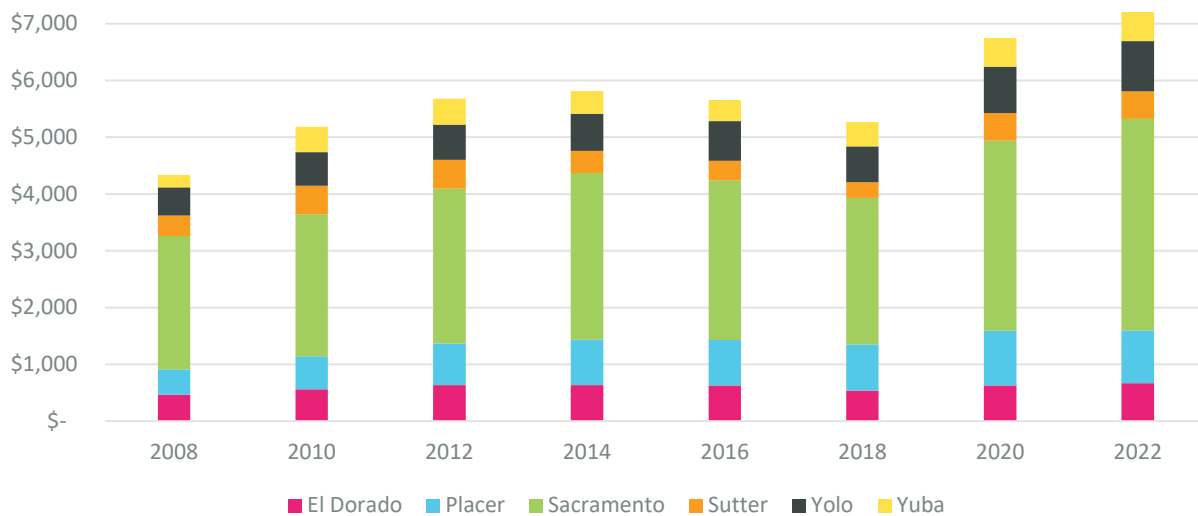
FIGURE 1-8 - LOCAL STREETS AND ROADS PAVEMENT CONDITION INDICES (PCI) 2008 TO 2022 BY COUNTY IN THE SACRAMENTO REGION



⁵ California Statewide Local Streets and Roads Needs Assessments, 2008 - 2022, <https://savecaliforniastreet.org/>, accessed April 2023.

As pavement conditions fall, costs to maintain pavement go up, but by how much? If you had 10 years to invest the right amount of money to avoid expensive road reconstruction costs of failed pavement, how much money would you need? 10-year pavement rehabilitation and reconstruction needs for the Sacramento Region in 2022 is over \$7.2 billion, the highest it has ever been.⁶ Figure 1-9, shows that the regionwide 10-year pavement need for local streets and roads is at its highest most recent years.

FIGURE 1-9 - 2008-2022 LOCAL STREETS AND ROAD 10-YEAR PAVEMENT NEEDS (IN MILLIONS) FOR THE SACRAMENTO REGION



This is the cost to reach what the Assessment describes as “Best Management Practices.”

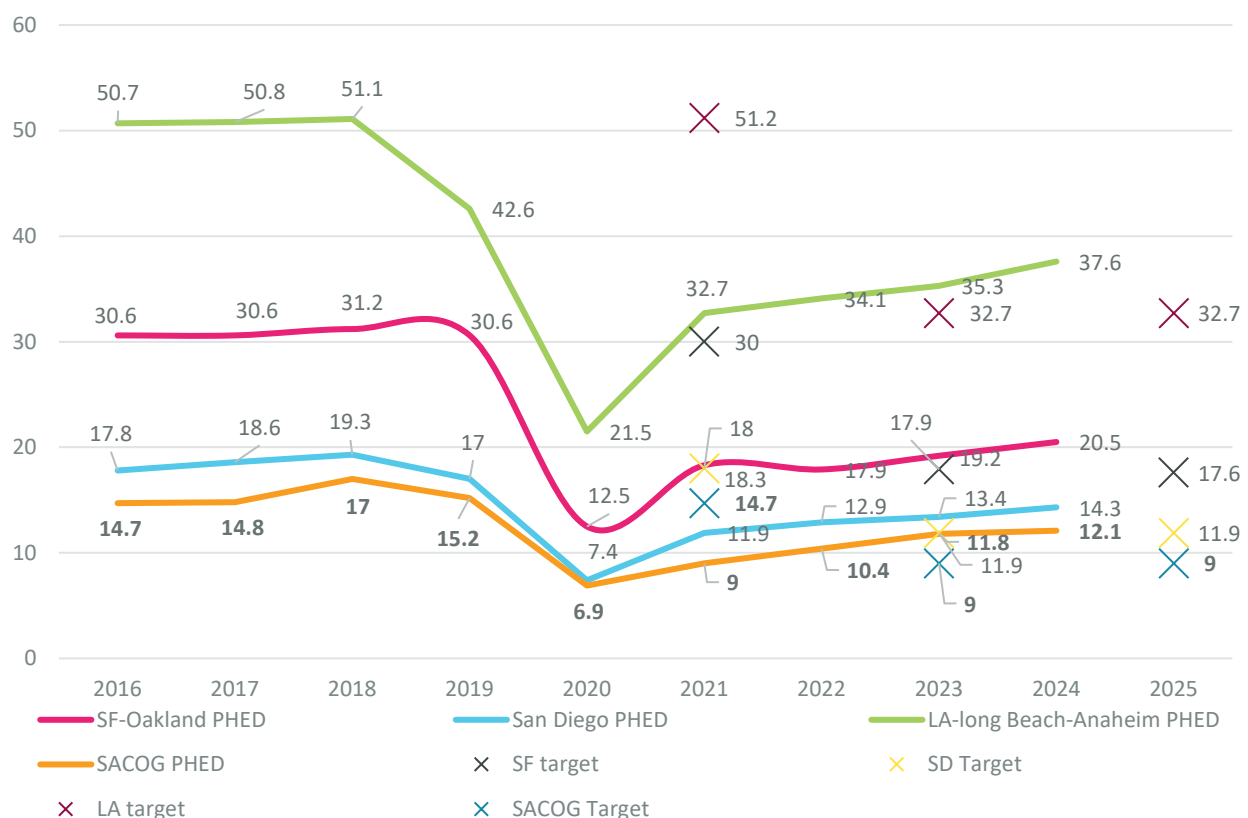
In order to use taxpayer money wisely, it makes more sense to preserve and maintain roads in good condition than to wait and repair or replace them when they deteriorate or fail. The costs developed in this study are based on achieving a roadway pavement condition called Best Management Practices [BMP]. At this condition level, preventive maintenance treatments [i.e., slurry seals, chip seals, thin overlays] are most cost-effective. In addition to costing less, preventive maintenance interferes less with commerce and the public’s mobility and is more environmentally friendly than rehabilitation or reconstruction.

⁶ California Statewide Local Streets and Roads Needs Assessments, 2008 - 2022, <https://savecaliforniastreet.org/>, accessed April 2023.

System Performance Management (PM3: Freight movement, congestion, emissions and reliability)

In 2022, the National Performance Management Research Data set (NPMRDS)⁷ used “big data” to determine that the average commuter in the Sacramento Urban Area spent a total of 10.4 hours that year delayed in rush hour traffic (or about 2.4 minutes of delay per work day).⁸ Figure 1-10 shows how this trend progressed since 2016 in both the SACOG region and other urbanized areas. The average SACOG region commuter spends less time delayed in traffic than in the average commuter in San Diego, San Francisco-Oakland and Los Angeles-Long Beach-Anaheim areas. SACOG supports meeting this statewide target of reducing excessive delay, currently at 1% or 9 hours for the Sacramento Urbanized Area (UA).

FIGURE 1-10 - ANNUAL HOURS OF PEAK-HOUR EXCESSIVE DELAY (PHED) PER CAPITA FOR URBANIZED AREAS IN SACRAMENTO, SAN FRANCISCO, SAN DIEGO AND LOS ANGELES WITH 4-YEAR TARGETS



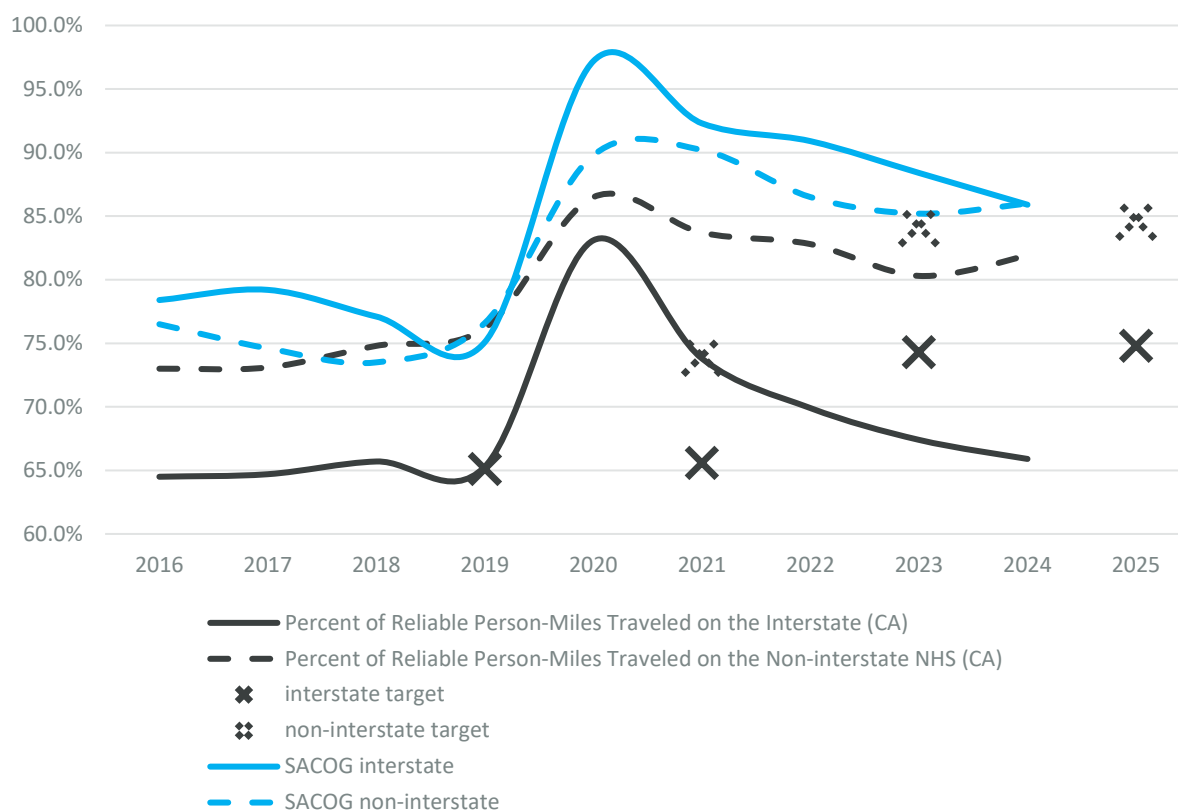
In addition to reducing delay, improving road system performance involves increasing the reliability of travel. SACOG supports the statewide target of increasing the percent of reliable person-miles traveled by 1% by 2025, (currently

⁷ SACOG staff have spot checked the NPMRDS source data and calculations for the Sacramento Urban Area and believe the dataset is a useful tool for identifying delayed locations and the length of a delayed segment of highway. However, staff found multiple locations where the traffic count numbers used for the PHED metric differed significantly from local count data, resulting in inaccurate PHED estimates. SACOG staff plan to continue to work with NPMRDS data managers to improve the dataset’s accuracy, using their online reporting tools.

⁸ National Performance Management Research Data Set (NPMRDS) Analytics Tool <https://npmrds.ritis.org/analytics>

74% for interstates and 84% for non-interstates in 2021]. Figure 1-11 presents the percentage of reliable person-miles travelled in the region compared to the state. The interstate system in the Sacramento Region remains more reliable at 88.4% than the statewide average of 67.4% in 2023.⁹ However, the non-interstate system in the Sacramento Region appears slightly more reliable at 85.2% than the state overall at 80.3%.

FIGURE 1-11 - 2016-2025 PERCENT OF RELIABLE PERSON-MILES TRAVELED IN THE SACRAMENTO REGION VS STATE, INTERSTATE AND NON-INTERSTATE SYSTEMS WITH 2-YEAR AND 4-YEAR TARGETS

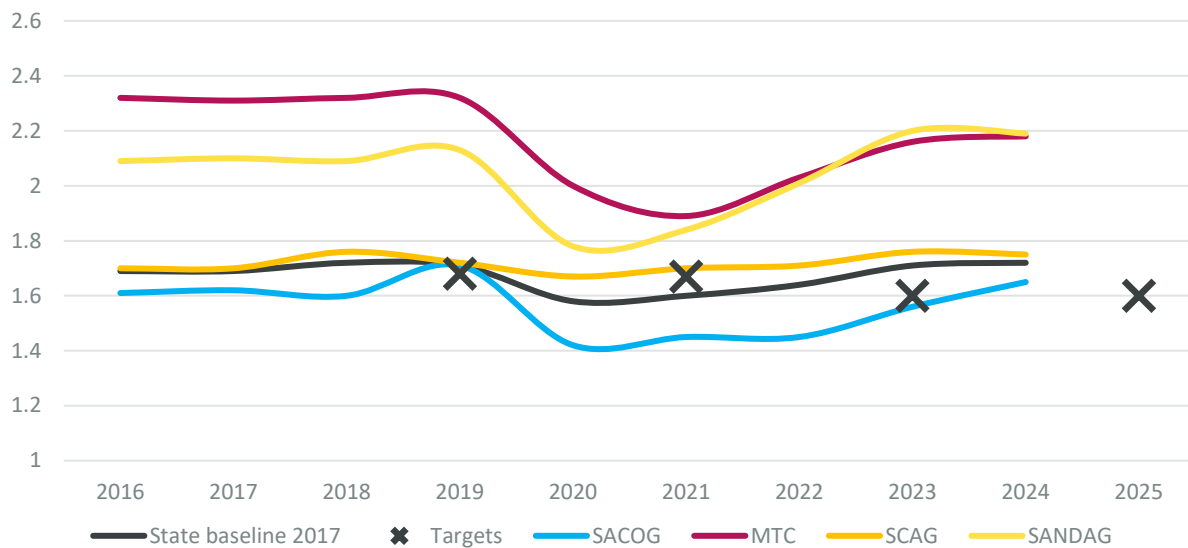


Freight reliability is calculated in a similar way, but instead of focusing on hours of delay in rush hour traffic, the Truck Travel Time Reliability is a ratio of greatly delayed truck travel times [95th percentile] divided by typical travel times [50th percentile]. A ratio of 1.00 [1/1] would tell you that the worst travel times are the same as the typical travel times. A ratio of 2.00 would tell you that the worst travel times are twice as bad as typical travel times. The chart below shows NPMRDS Truck Travel Time Reliability Indices. Figure 1-12 shows that the Sacramento Region saw a drop from 1.71 to 1.42 in 2020. Since then, the index has risen back to pre-pandemic levels reaching 1.65 in 2024. While the 2023 target of 1.6 was met, the index reached 1.65 in 2024, which exceeds the 2.25 target of 1.6.¹⁰

⁹ National Performance Management Research Data Set [NPMRDS] Analytics Tool [https://nprmrs.ritis.org/analytics]

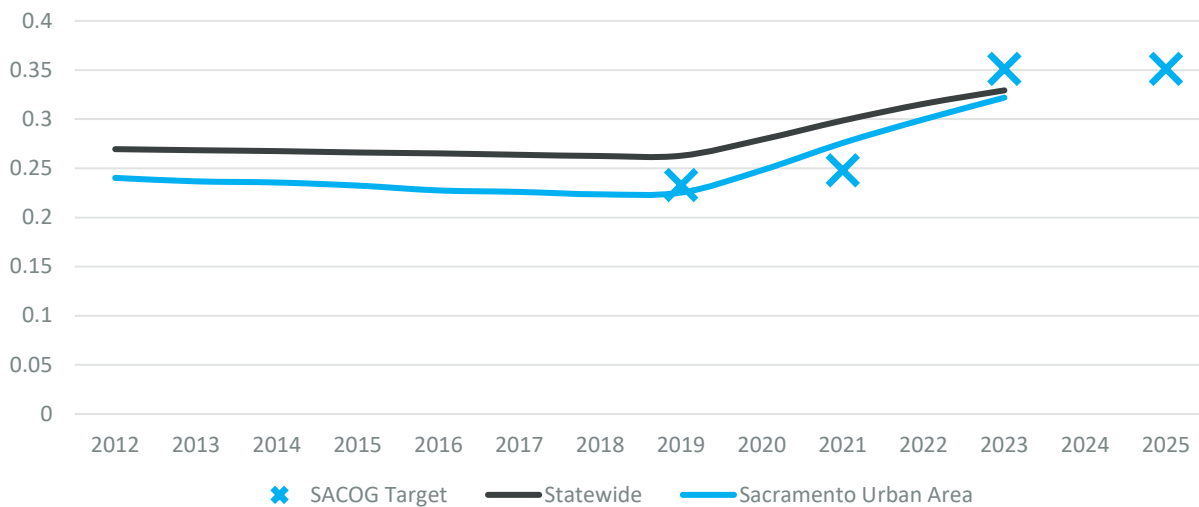
¹⁰ National Performance Management Research Data Set [NPMRDS] Analytics Tool [https://nprmrs.ritis.org/analytics]

FIGURE 1-12 - 2016-2025 RELIABLE TRUCK TRAVEL TIME (RATIO OF DELAY/TYPICAL) IN THE SACRAMENTO REGION VS STATE, ON THE INTERSTATE AND NON-INTERSTATE SYSTEMS WITH 2-YEAR AND 4-YEAR TARGETS



Other performance targets include increasing the percentage of non-single occupancy vehicle travel (e.g., walk, bike, transit, carpool, etc.) to 35.1% by 2025, as shown in Figure 1-13.¹¹

FIGURE 1-13 - 2012-2023 PERCENT OF NON-SINGLE OCCUPANT VEHICLES (SOVS) IN THE SACRAMENTO URBAN AREA VS STATE, WITH 2-YEAR AND 4-YEAR TARGETS



¹¹ U.S. Census Bureau, 2016-2024 American Community Survey 5-Year Estimates

Emissions Reductions by Applicable Pollutants under the CMAQ Program

The investments cited in the 2018 Sacramento Urbanized Area Congestion Mitigation and Air Quality Improvement Program Performance Plan, for the baseline performance period report 2018-2021, contribute to meeting the statewide targets for Total Emissions Reductions by Applicable Pollutants under the CMAQ Program: VOC [kg/day], CO [kg/day], NO_x [kg/day], PM₁₀ [kg/day], and PM_{2.5} [kg/day].

During the current performance period [2018-2021], 59 projects are expected to obligate CMAQ funds. A list of these projects is provided in the table below. It includes a description of how each project is anticipated to contribute towards achieving the performance targets for traffic congestion and on-road mobile source emissions.

Since the statewide baseline conditions reflect CMAQ funded projects that first obligated CMAQ funds between 2014 and 2017, the projects listed in Table 1-4 only reflect CMAQ funded projects during the 2018-2021 performance period.

FHWA notes that reporting emissions benefits for each CMAQ project is not required but “could discuss relevant estimates of emissions reductions in order to demonstrate how the projects will contribute to the relevant targets.” SACOG estimates and records CMAQ project emissions benefits as directed by the California Air Resources Board’s (ARB) 2005 guidance document, “Methods to Find the Cost-Effectiveness of Funding Air Quality Projects for Evaluating Motor Vehicle Registration Fee Projects and CMAQ Projects.” The emissions benefits calculated focus on VOC, NO_x, PM₁₀ and PM_{2.5} criteria pollutants. SACOG does not include estimates of CO emissions benefits at this time, but may do so in the future for traffic signal synchronization projects. The ARB guidance notes that “CO is a localized pollutant and not a regional pollution problem” where CMAQ projects are usually “funded primarily to reduce regional ozone and PM₁₀ and have little impact on localized CO hot spots.” The Air Resources Board does note that “signal coordination projects, however, may be targeted at specific CO hot spots in CO nonattainment areas” and that “reporting CO emission reductions should be limited to targeted projects located in CO nonattainment or maintenance areas.

TABLE 1-4 - DESCRIPTION OF PROJECTS IN CMAQ PERFORMANCE PLAN FOR 2022-2025 PERFORMANCE PERIOD

Title	Lead Agency	1st Year CMAQ Obligation	VOC Benefit kg/day	CO Benefit kg/day	NOX Benefit kg/day	PM10 Benefit kg/day	PM2.5 Benefit kg/day	Traffic Congestion Benefit? Peak-hour Excessive Delay	Traffic Congestion Benefit? Non-SOV Mode Share
Bass Lake Road at Bridlewood Roundabout	El Dorado County	2023	0.02		0.1			Yes	
Broadway Complete Street Phase 3	City of Sacramento	2026	*	*	*	*	*		Yes
C Street Enhancements	City of Galt	2022	0.02		0.01	0.03			Yes
Canal Street Bicycle and Pedestrian Improvement Project Phase 1	City of Placerville	2023	0.02	0.01					Yes
Complete Streets Rehabilitation - Multiple Locations	Sacramento County	2022	0.12		0.08		0.02		Yes
Diamond Springs Pedestrian Facility Improvements	El Dorado County	2023	0.06	0.03		0.01			Yes
Dry Creek Greenway Trail, Phase 2	City of Roseville	2023	*	*	*	*	*		Yes
Henningsen Park/Lotus Road Class I Multi-Use Trail Improvements	El Dorado County	2023	0.03		0.02				Yes
I-80/Rocklin Rd. Interchange Improvements	City of Rocklin	2024	0.07		0.04		0.01	Yes	
Industrial Avenue Rehabilitation Project	City of Lincoln	2026	*	*	*	*	*		Yes
La Canada Drive and Gateway Drive	El Dorado County	2023	0.04	0.02			0.01		Yes

Title	Lead Agency	1st Year CMAQ Obligation	VOC Benefit kg/day	CO Benefit kg/day	NOX Benefit kg/day	PM10 Benefit kg/day	PM2.5 Benefit kg/day	Traffic Congestion Benefit? Peak-hour Excessive Delay	Traffic Congestion Benefit? Non-SOV Mode Share
Pedestrian/Bicycle Improvements									
Laguna Creek Inter-Regional Trail Crossing at State Route 99	City of Elk Grove	2023	0.04		0.02		0.01		Yes
Mahany Park Trail Design and Construction	City of Roseville	2025	*	*	*	*	*		Yes
Operating Assistance South Placer County Transit Project	City of Roseville	2022	1.62		0.68		0.63		Yes
Pedestrian and Bicycle Gap Closure - Folsom Lake Recreation Area	Placer County	2024	0.07		0.05	0.02			Yes
Placer County Congestion Management Program FY 2023-2027	PCTPA	2023	7.68		6.3		3.53	Yes	
Placerville Drive Pedestrian Connectivity Project	City of Placerville	2022	0.02		0.01				Yes
Regional Bike Share Program	SACOG	2023	0.25		0.5	2.98	2.89		Yes
Sacramento River Parkway Phase 2	City of Sacramento	2025	*	*	*	*	*		Yes
San Juan Ave. Complete Streets Rehabilitation - Phase 1B	City of Citrus Heights	2026	*	*	*	*	*		Yes

Title	Lead Agency	1st Year CMAQ Obligation	VOC Benefit kg/day	CO Benefit kg/day	NOX Benefit kg/day	PM10 Benefit kg/day	PM2.5 Benefit kg/day	Traffic Congestion Benefit? Peak-hour Excessive Delay	Traffic Congestion Benefit? Non-SOV Mode Share
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
SECAT Program Phase 3	SMAQMD	2024	9		236	21			
Shingle Springs El Dorado Trail Class I Improvements	El Dorado County	2023	0.1		0.06	0.02			Yes
Spare the Air Program Phase 4	SMAQMD	2025	0.2		0.2				Yes
Tahoe Truckee Area Regional Transit (TART) Battery Electric Bus	Placer County	2026			0.05		0.004		Yes

* SACOG will update emissions reduction calculations with the project sponsor during the next 2025 MTIP amendment.

Section 2: 2025 Blueprint Performance

This section describes how implementing the 2025 Blueprint would result in changes to the region. Regional model outputs are summarized by the following topics with some related to PM2 and PM3 metrics.

- Land Use Patterns
- Housing Mix
- Access to Employment Activities
- Road and Highway System (Related to PM2)
- Transit System (Related to PM3)
- Travel Choice (Related to PM3)
- Land Use and Transportation Integration
- Vehicle Miles of Traveled
- Greenhouse Gas Emissions (Related to PM3)

Land Use Patterns

The 2025 Blueprint includes growth in a variety of communities throughout the region to provide residents with choices for where to live and work. The land use forecast assumes 67 percent of new homes will occur in infill areas, which are characterized in the 2025 Blueprint as Established Communities and Center and Corridor Communities. By 2050, the 2025 Blueprint forecasts that more homes, 19 percent of all homes compared to 13 percent in 2020, will be in Center and Corridor Communities where residents access the greatest mix of amenities, jobs, and transportation options.

TABLE 2-1 - SHARE OF HOMES BY COMMUNITY TYPE

Performance Metric	2020 Baseline	Change [2020-2050]	By 2050
Share of homes in Center & Corridor Communities	125,525	110,234	235,759
<i>(percent of total homes in region)</i>	<i>13%</i>	<i>40%</i>	<i>19%</i>
Share of homes in Established Communities	718,103	76,244	794,347
<i>(percent of total homes in region)</i>	<i>76%</i>	<i>27%</i>	<i>65%</i>
Share of homes in Developing Communities	23,761	88,761	112,522
<i>(percent of total homes in region)</i>	<i>2%</i>	<i>32%</i>	<i>9%</i>
Share of homes in Rural Residential Communities*	82,037	2,351	84,388
<i>(percent of total homes in region)</i>	<i>9%</i>	<i>1%</i>	<i>7%</i>
Share of homes in Lands Not Identified for Growth in the 2025 Blueprint	1,090	0	1,090
<i>(percent of total homes in region)</i>	<i>0.1%</i>	<i>0%</i>	<i>0.09%</i>
Total Homes	950,516	277,590	1,228,494

Housing Mix

While approximately 60 percent of existing homes in 2020 are small-lot or attached product types, the 2025 Blueprint plans to provide a greater diversity of homes for future residents by increasing the number of small-lot and attached housing available throughout the region. To achieve more housing choices by 2050, the 2025 Blueprint forecasts 78 percent of new homes over the next 20 years to be small-lot or attached products.

TABLE 2-2 - SHARE OF HOMES, RURAL RESIDENTIAL/LARGE LOT VS. SMALL LOT/ATTACHED HOMES

Performance Metric	2020 Baseline	Change [2020-2050]	By 2050
Share of homes in rural residential and large-lot single-family homes	370,885	62,157	427,547
<i>(percent of total homes in region)</i>	<i>39%</i>	<i>22%</i>	<i>35%</i>
Share of homes in small-lot single-family or attached homes	579,631	215,433	800,947
<i>(percent of total homes in region)</i>	<i>61%</i>	<i>78%</i>	<i>65%</i>

Access to Employment Activities

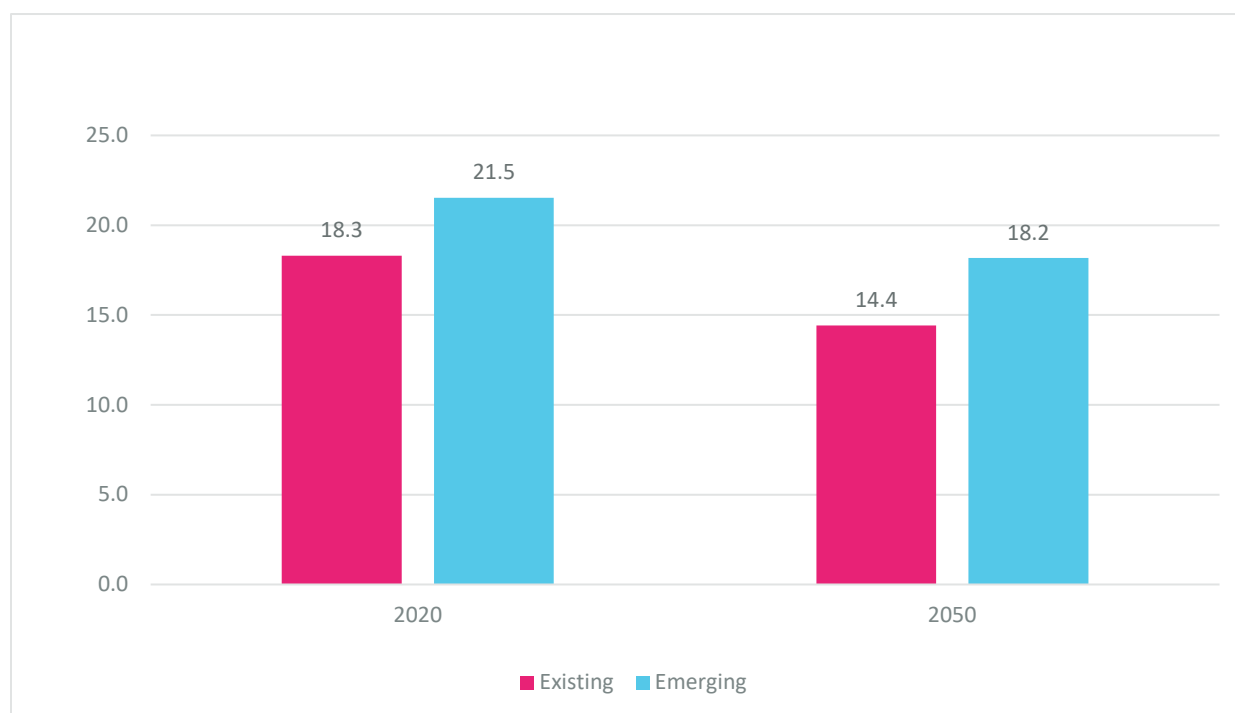
Access, in this instance, means the number of activities a person can reach within a given travel time and mode. Improved access to jobs correlates with lower vehicle miles traveled (i.e., if someone has a lot of nearby jobs, they tend to drive less overall). Access can be increased in two ways: 1) improving travel speeds to increase the area one can reach within a given travel time; 2) putting more activities closer to homes through more focused growth. The 2025 Blueprint affects both, through more infill and compact development, reduction of congestion on key corridors for drivers, and improvements to transit service to reduce transit travel times. Table 2-3 shows both drivers and transit riders will have better access to jobs regionwide. Notably, the number of jobs within a 30-minute transit trip more than quadruples by 2050.

TABLE 2-3 - ACCESS TO JOBS FROM HOMES BY 30-MINUTE DRIVE AND TRANSIT

Performance Metric	2020 Baseline	Change [2020-2050]	By 2050
Jobs within 30-minute drive of average worker	415,598	107,188	522,786
Jobs within a 30-minute transit trip of average worker	6,796	23,043	29,839

This increase in job accessibility can lead to a reduction in the amount of travel needed to access people's desired jobs as well. Average vehicle miles traveled (VMT) per worker to the region's jobs centers captures both trip length and mode of travel. Average VMT per worker can be reduced by shortening commute distances, or by shifting more travel into non-vehicle modes like biking or walking. The 2025 Blueprint shortens commutes by improving jobs-housing ratios and enhancing non-vehicle and transit modes to jobs centers. Although emerging job centers continue to have a higher VMT than existing job centers, the improvements with the 2025 Blueprint lead to a reduction of the average VMT per worker. By 2050 the average VMT per worker would be reduced by around 4 miles and 3 miles for workers heading to existing and emerging job centers respectively.

FIGURE 2-1 - AVERAGE VEHICLE MILES TRAVELLED PER WORKER TO EXISTING AND EMERGING JOB



Road and Highway System

In the 2025 Blueprint, roadway lane miles¹² increase by 765 lane miles by 2050 about 6.5 percent compared to 2020. That comes out to an average around of 25 lane miles per year. Table 2-5 and Figures 2-2 and 2-4 shows that this increase happened to different roadway types through either widening existing roads or building new ones. Nearly three quarters of the overall increase in lane miles can be attributed to local roads¹³. The rest is mostly due to adding high-occupancy lanes, auxiliary lanes of varying lengths, ramps expansions and freeway connectors. The newly constructed high-occupancy highway lane miles nearly double the existing amount with 117 lane miles coming online in the next 30 years as part of the 2050 managed lanes network. The change to general purpose highway lane miles, however, remains minimal (0.8 percent). Moreover, nearly 60 percent of new lane miles come from widening existing facilities in a phased manner. These widenings help to add capacity to existing roadways as housing and employment growth occur. The 2025 Blueprint does not include every road and highway expansion project that may eventually be needed to accommodate full buildout of local general plans. Instead, the plan focuses on expansion for growth that is anticipated in its 20-year plan horizon.

¹² Referring to lane miles modeled as part of the SACSIM23 traffic demand analysis, SACSIM is a stick-point, not true shape, representation of roadway networks with representation of collector and larger roadways.

¹³ Local roads in this context include expressways, arterials, and select collectors and rural roads

TABLE 2-4 - NEW OR EXPANDED ROAD NETWORK LANE MILES

Roadway/Lane Type	2020 Baseline	Change [2020- 2050]	By 2050	% Change from 2020
Highway Network				
General Purpose Freeways	1,663	13	1,676	0.8%
High Occupancy Vehicle [HOV] / High Occupancy Toll [HOT] Lanes	130	117	247	90.3%
Auxiliary Lanes, Ramps and Connectors	223	74	297	33.2%
Local Roads Network ¹³				
Other Roads				
	9,194	560	9,754	5.9%
Total Road Lane Miles ¹²	11,209	765	11,974	6.5%
Lane Miles Added from Building New Roads	-	-	380	-
Lane Miles Added from Widening Existing Roads	-	-	383	-

Lane miles based on SACSIM23 road network excluding all roadways outside of SACOG region. No High Occupancy Toll [HOT] lanes exist in 2020 baseline.

Source SACOG 2025.

FIGURE 2-2 - 2020 LOCAL ROAD AND HIGHWAY NETWORK

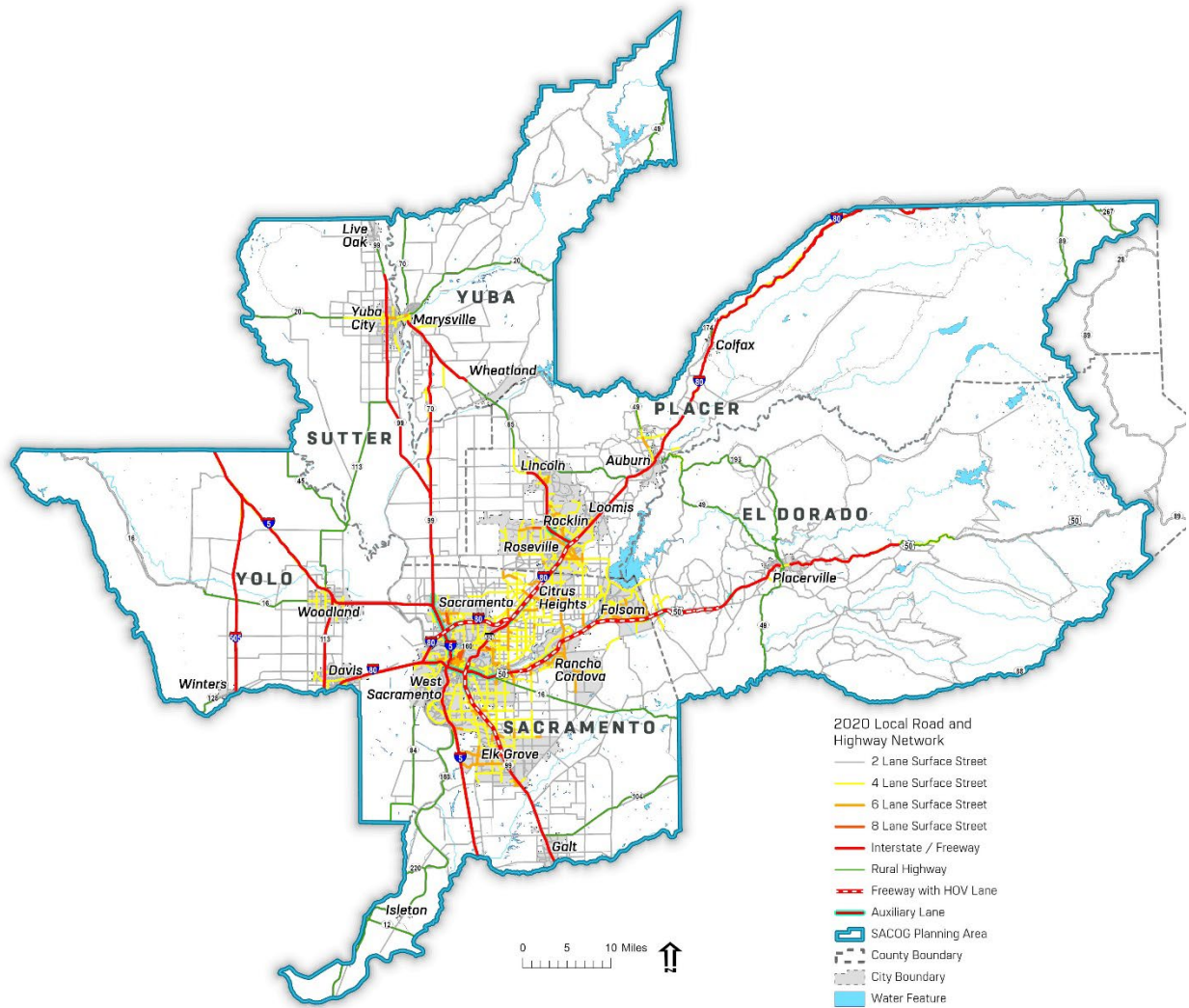
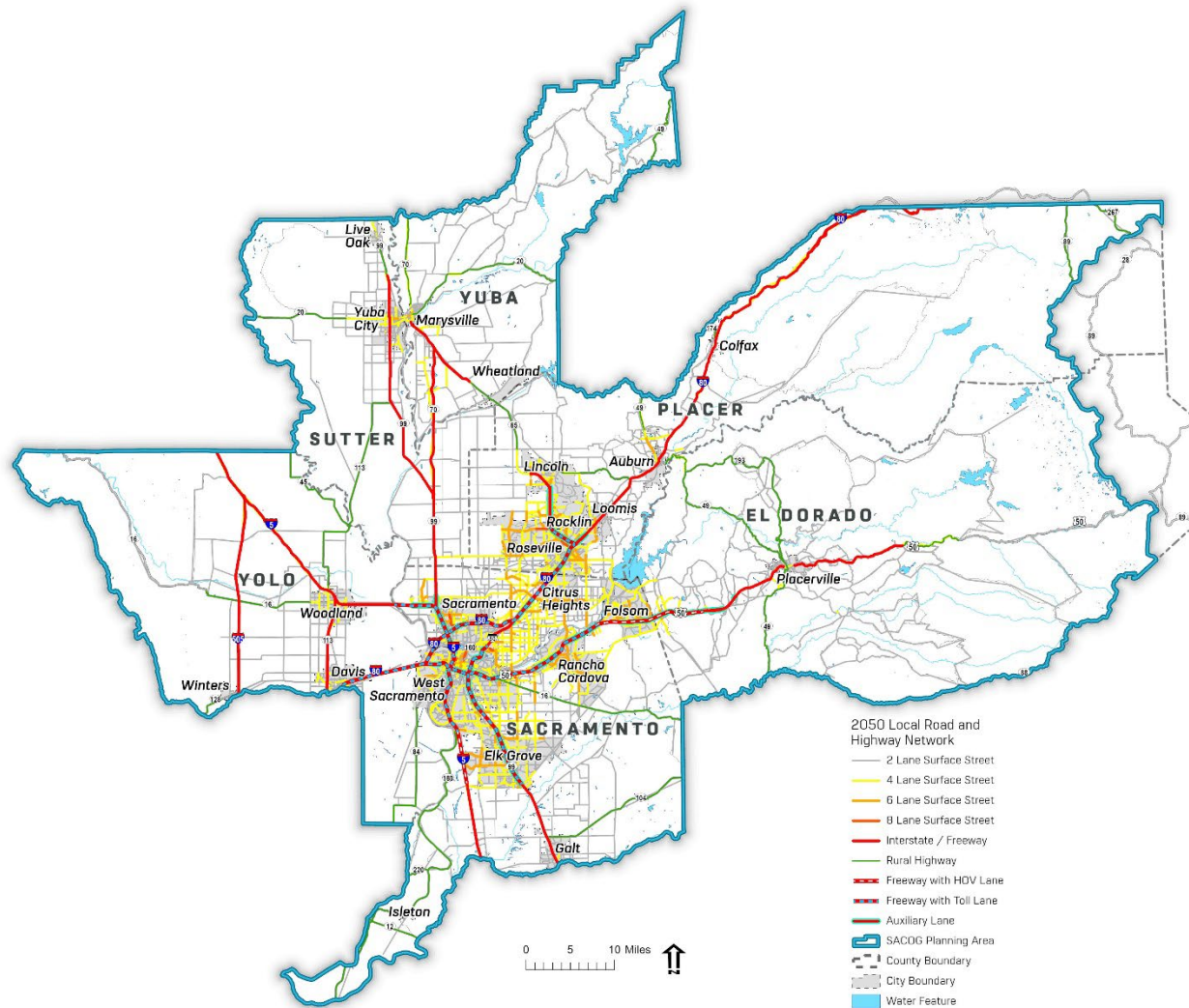


FIGURE 2-3 - 2050 LOCAL ROAD AND HIGHWAY NETWORK



Managed Lanes

A key investment of the 2025 Blueprint for the regional roads and highways is to focus on a more reliable and sustainable way to pay for transportation capital projects and maintenance of the system by investing in a system-wide managed lanes network. The 2025 Blueprint managed lanes network was developed using a system-wide performance approach by comparing a variety of managed lanes facility types across the entire region. The region currently has over 130 miles of High Occupancy Vehicle (HOV) lanes. HOV lanes have limited capacity to support reliable trips. When the vehicle volume exceeds an HOV lane's capacity, these facilities can be considered degraded with more congestion and lower speeds¹⁴. By comparison, priced managed lanes provide tools to manage the demand and maintain higher reliability than HOV lanes.

¹⁴ Subsection [d] of 23 U.S.C. § 166, Federal-Aid Highway Program Guidance, FHWA

To determine the final priced managed lane network for the 2025 Blueprint, shown in Figure 2-4, staff developed and comparatively analyzed six scenarios. Table 2-5 shows the amount and type of managed lanes in each scenario. Table 2-6 shows how each scenario performs on key mobility metrics including travel time savings, VMT and ratio of congested VMT to VMT. Each scenario is compared to a “Benchmark Scenario” single lane High Occupancy Toll (HOT) 2+ network, which is based on Caltrans District 3’s Managed Lanes System Plan (2024), a regional plan developed in partnership with multiple agencies led by Caltrans District 3¹⁵. Across the scenarios, more lane miles in the system increase VMT and reduce CVMT.

The 2025 Blueprint scenario provides a slightly less expansive system than the Benchmark Scenario (120 vs. 150 miles) and focuses expansion on high demand segments; see Figure 2-4. The 2025 Blueprint scenario also converts general purpose lanes during peak times to improve reliability and travel time saving when the demand for travel is greatest. The 2025 Blueprint scenario takes a balanced approach, minimizing congestion and improving travel times while still decreasing VMT. The 2025 Blueprint scenario decreasing VMT by 1% regionally compared to the benchmark complete single HOT managed lane network regionally. The regional CVMT is 7.4% of total regional VMT, which is slightly higher than the benchmark complete HOT managed lane and less congestion than the existing HOV lane only scenario. The 2025 Blueprint scenario will also generate an average of 14 minutes travel time savings for people who use the facilities providing reliability to the managed lane system.

Finally, the 2025 Blueprint also generates enough revenues to build and maintain the managed lane system without driving high cost per mile prices for individual users. Table 2-7 shows these pricing indicators of each scenario compared to the Benchmark Scenario. The HOV scenarios do not generate revenues or have any cost per mile since these facilities are free and restricted to only high occupancy users. The 2025 Blueprint managed lane system generates more revenue and provides a lower average cost per mile than the Benchmark Scenario.

¹⁵ California Department of Transportation. *District 3 Managed Lanes System Plan* Dec. 2024

FIGURE 2-4 - 2050 BLUEPRINT MANAGED LANES

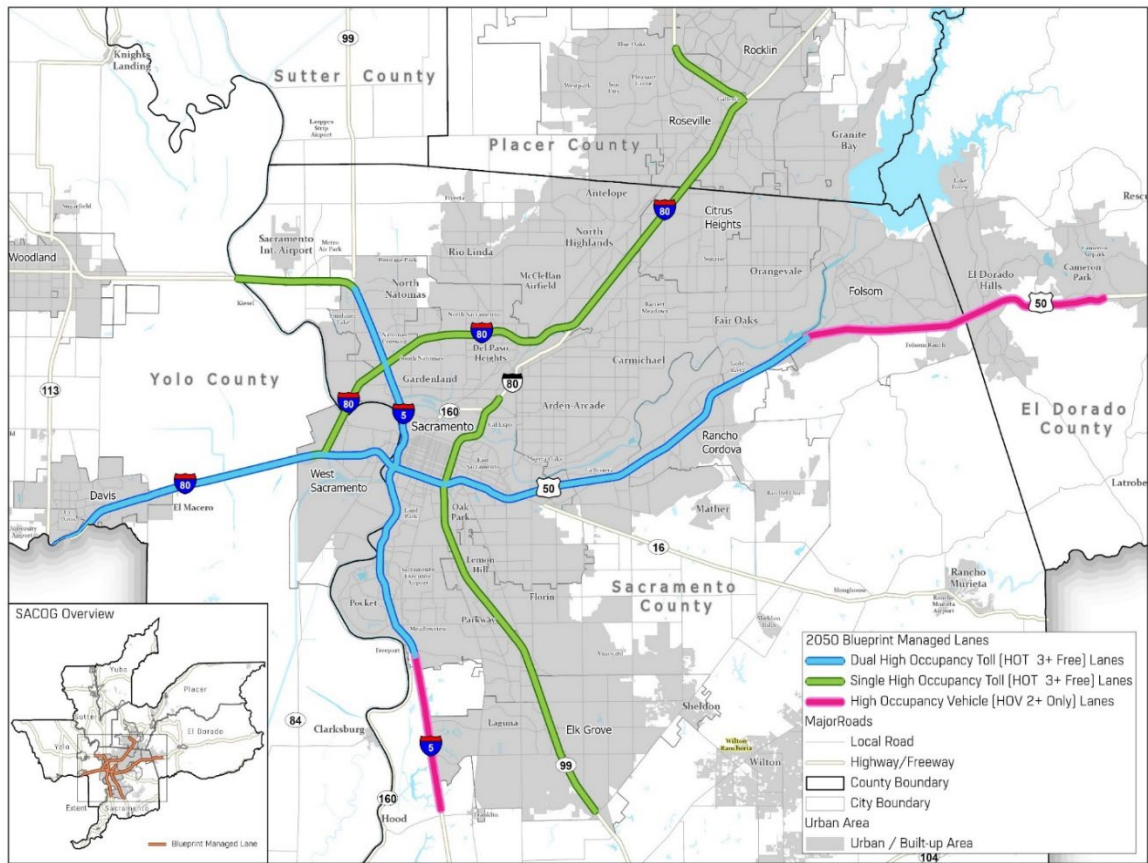


TABLE 2-5 - MANAGED LANE MILE TESTING SCENARIO SUMMARY

Testing Scenarios	Managed Lane Route	New Route	HOV conversion	GP conversion ²
Test 0 Benchmark Scenario – Complete Extent Single HOT [2+ Free] Network ¹	280	150	130	-
Test 1 No Build [2020 Base Year Built HOV lanes Only]	130	-	-	-
Test 2 Complete Extent single HOV [2+ Free] Network	280	150	-	-
Test 3 Complete Extent single HOT [3+ Free] Network	280	150	130	-
Test 4 Complete Extent dual HOT [2+ Free] Network (take a GP lane)	280	150	130	140
2025 Blueprint Managed Lane Network (3+ Free)	250	120	130	80

1. Complete extents based on D3 MLSP [2024] existing and planned system extents.

2. Single general purpose lane conversion only during AM or PM peak period based on congestion and vehicle demand by managed lane corridor. During off peak periods both HOV and General-purpose lane conversions are operated free without restrictions for all users.

TABLE 2-6 - MANAGED LANE MOBILITY INDICATORS TESTING SCENARIO SUMMARY

Testing Scenarios	Average Travel Time Savings vs Free Lane [minutes]		Regional Roadway Total VMT ²		Regional Total Congested VMT to VMT Ratio	
Test 0 Benchmark Scenario – Complete Extent Single HOT Network ¹	-9.3		78,720,000		6.6%	--
Test 1 No Build [Base Year HOV lanes Only]	-9.5	2.2%	78,087,000	- 0.8%	7.9%	19.2%
Test 2 Complete Extent single HOV [2+ Free] Network	-6.4	- 31.8%	78,696,000	0.0%	6.8%	2.4%
Test 3 Complete Extent single HOT [3+ Free] Network	-10.4	11.7%	78,556,000	- 0.2%	6.9%	4.8%
Test 4 Complete Extent dual HOT [2+ Free] Network [take a GP lane]	-15.4	65.2%	77,978,000	- 0.9%	7.9%	19.8%
2025 Blueprint Managed Lane Network [3+ Free]	-13.9	49.2%	77,937,000	- 1.0%	7.4%	12.1%

1. Complete extents based on D3 MLSP [2024] existing and planned system extents.

2. Regional VMT based on testing on discussion scenario for the 2025 Blueprint development in 2023-2024 and does not reflect the final roadway VMT for the 2025 Blueprint final scenario, but is a good indicator to relative change compared to alternative managed lane systems shown in table.

TABLE 2-7 - MANAGED LANE PRICING INDICATORS TESTING SCENARIO SUMMARY

Testing Scenarios	Average Cost per Mile ²		Est. Gross Revenue [annual millions] ³	
Test 0 Benchmark Scenario – Complete Extent Single HOT Network ¹	\$0.20		\$8.4	
Test 1 No Build [Base Year HOV lanes Only]	\$0.00	-	\$0.0	-
Test 2 Complete Extent single HOV Network	\$0.00	-	\$0.0	-
Test 3 Complete Extent single HOT [3+ Free] Network	\$0.06	-66.7%	\$59.1	607%
Test 4 Complete Extent dual HOT Network [take a GP lane]	\$0.06	-65.2%	\$114.0	1,264%
2025 Blueprint Managed Lane Network [3+ Free]	\$0.04	-75.4%	\$80.4	863%

1. Complete extents based on D3 MLSP [2024] existing and planned system extents.

2. Cost per mile based on SACSIM23 travel demand model outputs from the dynamic pricing assignment. Estimated use for testing different facilities operations and should be used as a program level estimate, not a substitute for a traffic and revenue study.

3. Gross revenues based on SACSIM23 travel demand model outputs from the dynamic pricing assignment. Estimates used for testing different facilities operations and should be used as a program level estimate, not a substitute for a traffic and revenue study.

Transit System

SACOG developed the Blueprint's transit system and service assumptions based on the following:

- Completing major transit projects nominated by transit agencies.
- Implementing recommendations from the [2024 Regional Transit Network Study](#).
- Financially constraining transit service assumptions so estimated operating costs do not significantly exceed expected operating revenue.
- Incorporating input from transit agency staff.
- Adjusting service levels and coverage to be commensurate with expected ridership.
- Adding new transit service to greenfield areas with significant expected job and housing growth.

The transit-related performance metrics in this section reflect fixed-route bus and rail services operated by public transit operators based in the SACOG region, plus regional rail services. They do not capture on-demand transit, vanpools, ADA-specific transit services, commuter buses operated by agencies based outside the SACOG region, or transit operated by private entities (e.g. casino shuttles, employer-specific services, etc.).

In the 2025 Blueprint, transit service hours triple between 2020 and 2050, as shown in Table 2-8. This increase can be noticed in Figures 2-5 and 2-6, which respectively show the 2020 and 2050 transit networks in the region. This service increase comes primarily from commuter and fixed-route buses, with a smaller increment coming from light rail.

TABLE 2-8 - WEEKDAY TRANSIT REVENUE SERVICE HOURS BY SERVICE TYPE 2020 AND 2050

Service Types	2020	2050	Change from 2020	
			#	%
Light Rail	241	309	+68	28%
Tram/Streetcar	0	30	+30	-
Express Bus	391	979	+588	150%
BRT/Fixed Route Bus	2,078	7,095	+5,017	241%
Shuttle	256	730	+474	185%
Regional Rail	20	49	+29	144%
Regional Total	2,986	9,192	6,206	208%

Note: Excludes services offered between 12AM and 5AM. Regional rail modeled does not include external travel to or from the region. All estimates from SACSIM travel demand model.

FIGURE 2-5 - 2020 TRANSIT NETWORK

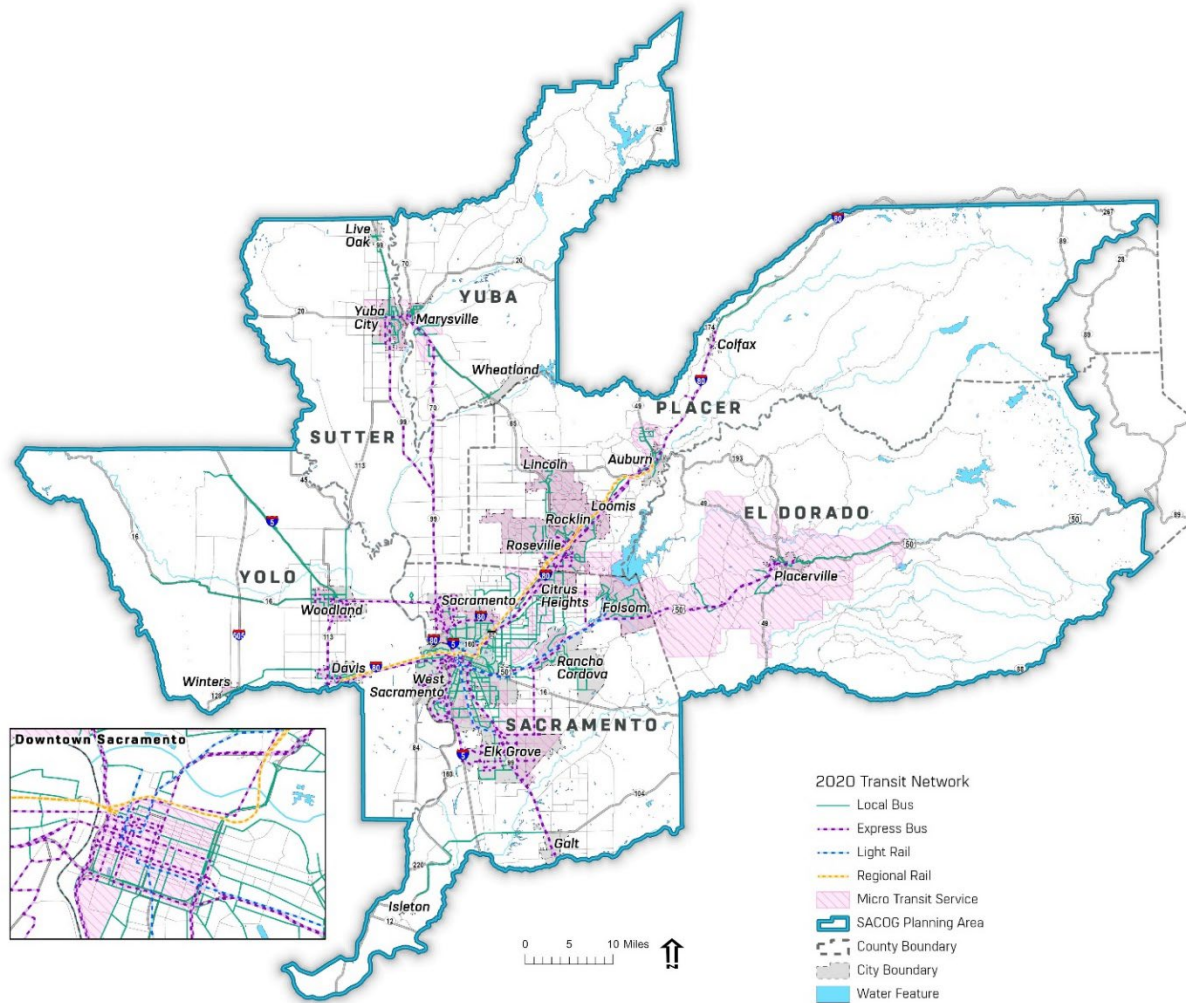
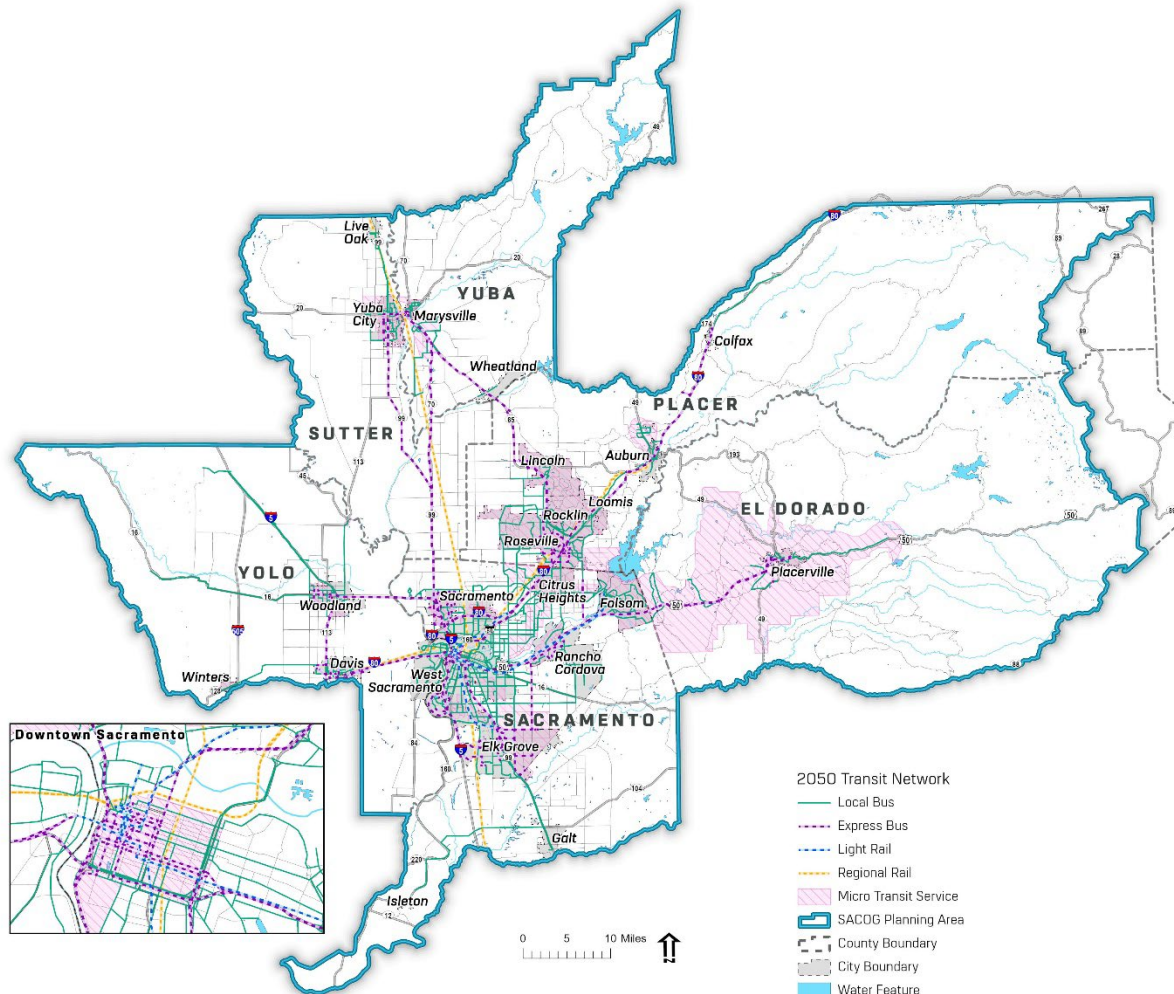


FIGURE 2-6 - 2050 TRANSIT NETWORK



The transit network in the 2025 Blueprint emphasizes increased frequencies on productive transit routes to provide faster access to jobs and job centers, see extents in Figure 2-7. The number of homes that have access to high-frequency transit will increase by almost five-fold by 2050. Additionally, more than twice the number of jobs will be accessible via high-frequency transit by 2050. This increase in accessibility includes both existing and forecasted homes and jobs. The proximity of homes and jobs to high-frequency transit service [vehicles coming at least every 15 minutes] is presented in Figure 2-8.

FIGURE 2-7 - HIGH FREQUENCY TRANSIT AREAS

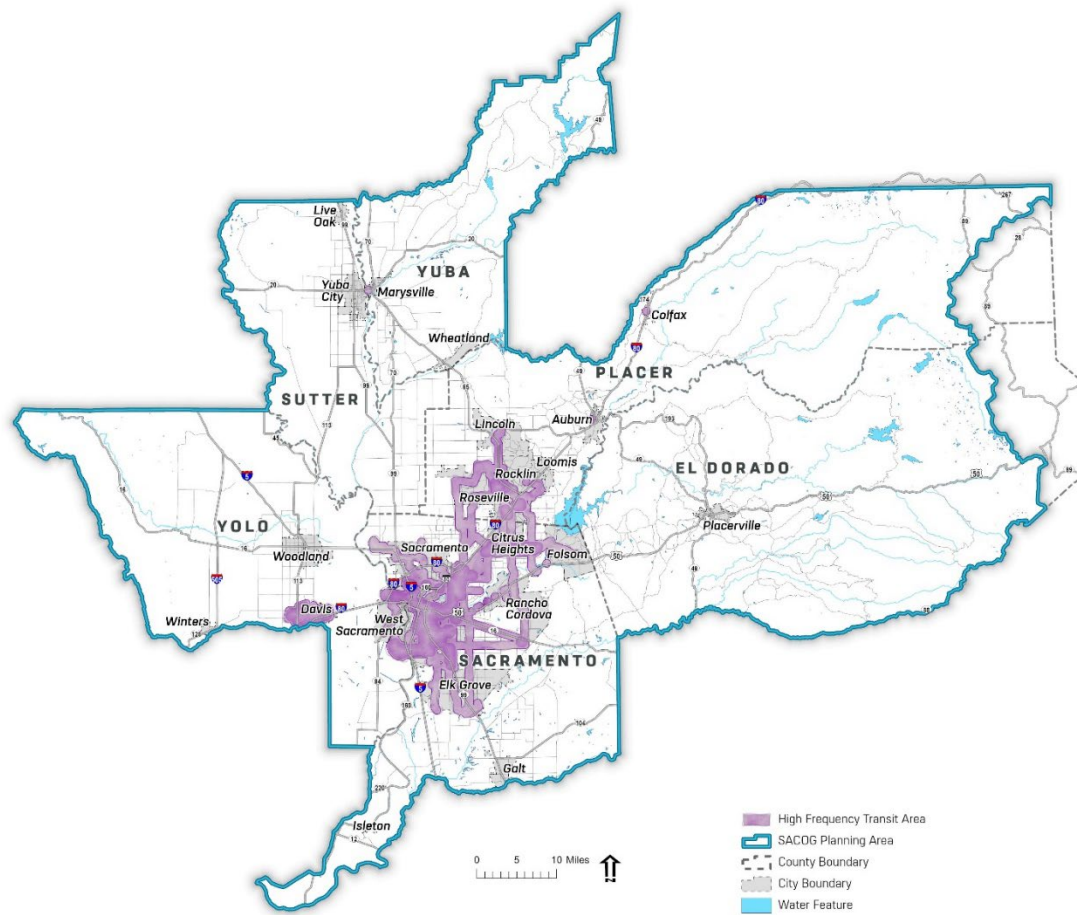
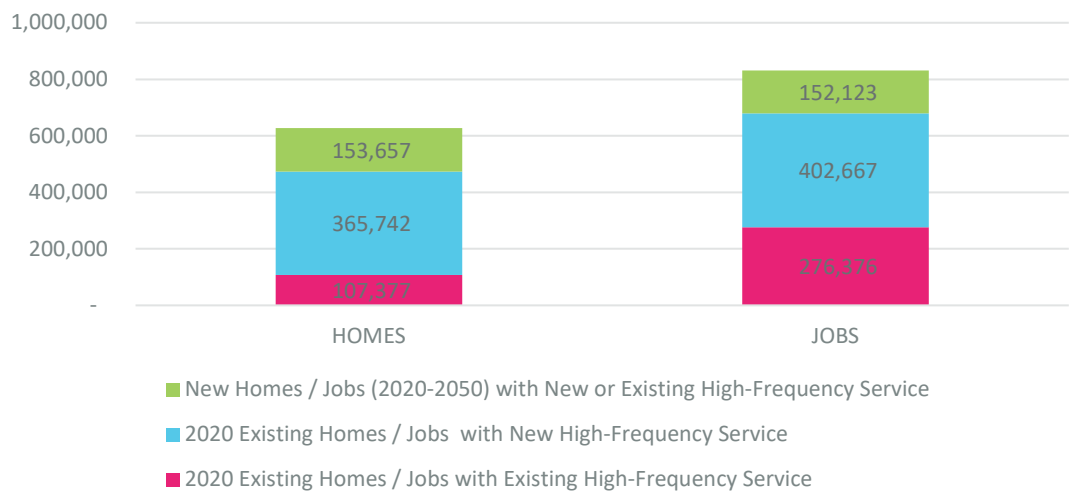


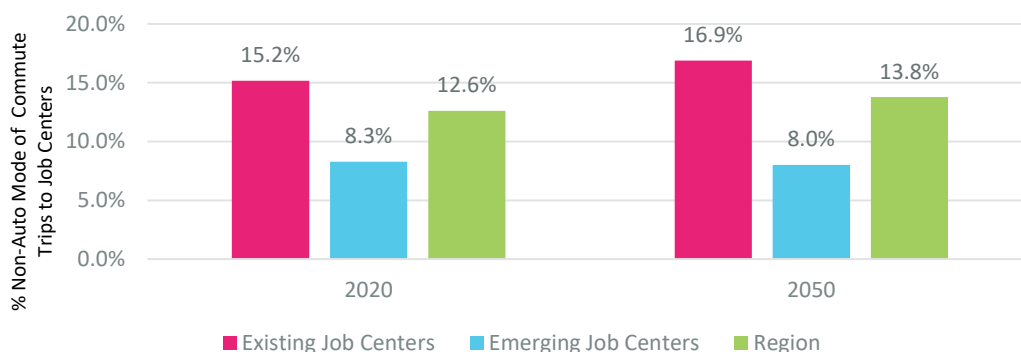
FIGURE 2-8 - HOUSING AND EMPLOYMENT WITHIN HIGH-FREQUENCY TRANSIT AREAS, 2020 - 2050



Travel Choice

The 2025 Blueprint aims to make it easier to get to work by transit, biking, or walking. Figure 2-9 shows that the percentage of commute trips that are made by non-auto commuters. Non-auto commuting increases slightly region-wide [1.2%] and more in existing job centers [1.7%]. However, the non-auto commute to emerging job centers remains stagnant [0.3% decrease].

FIGURE 2-9 - NON-AUTO MODE OF TRAVEL FOR SACOG REGION IN 2020 AND 2050



Since the covid-pandemic [2020], the increase in teleworking, hybrid and more flexible work schedules has had a significant impact to commute mode choice as well as total number commute travel within the region.

Figure 2-10 – Average Percent of Workers who Work from Home Daily [2020-2024]¹⁶ shows that 48 percent of workers nationally on an average day worked from home during August 2020. Over the last few years, Work from Home Research institution has tracked how this change has occurred through the Survey of Workforce Arrangements and Attitudes as more businesses have opened back up and more people have returned to work. By 2023 and 2024 nationally the SWAA survey data shows largely stabilizing of telework force employees. Given only four years of data since the pandemic, it is difficult to predict additional changes in telework schedules for workers by 2050. The 2025 Blueprint forecasts reflect changes in more flexible and hybrid work schedules based on the latest 2024 data trends close to 28 percent of the average workers work from home. Table 2-9 shows the percentage of workers that work full-time in the office, full time teleworkers, hybrid, and work from home offices. From these workers, both in the base year and 2050 the highest VMT occurs from workers with hybrid work schedules; where they both work from the office as well as at home in the same day. The lowest VMT occurs from workers that are full time telework, however even though these workers VMT is less than average, they still travel 13.3 VMT in 2020 and 12.7 VMT in 2050 daily.

Trip purpose plays a vital role in mode choice. Table 2-10 presents mode choice for commute and non-commute trips in 2020 and 2050. While both types of trips are mostly drive-alone, non-commute trips involved a lot more carpooling. In 2020, almost 57% of non-commute trips are carpooled, compared to only 20% for commute trips. Also, non-commute trips, which outnumber the commute trips, have a slightly higher portion of non-auto travel [1.2 percent more]. By 2050, auto remains the main model of travel in the region; however, non-auto travel improves slightly for both trip types.

¹⁶ Barrero, Jose Maria, Nicholas Bloom, and Steven J. Davis, 2021. "Why Working From Home Will Stick," National Bureau of Economic Research Working Paper 28731; Data Collection From Survey of Working Arrangements and Attitudes, <https://wfhrefsearch.com>

FIGURE 2-10 - AVERAGE PERCENT OF WORKERS WHO WORK FROM HOME DAILY (2020-2024)

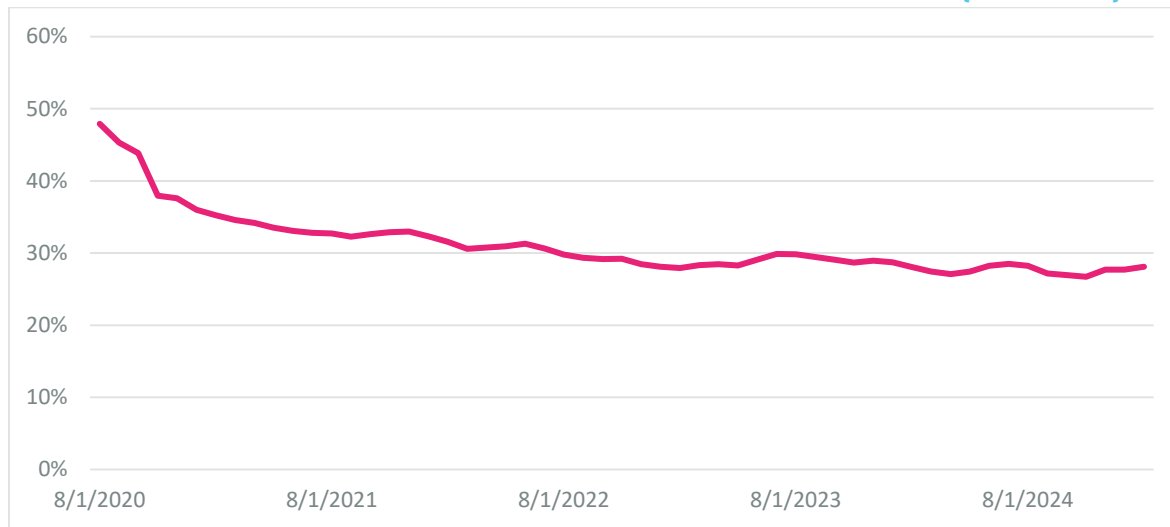


TABLE 2-9 - VMT BY WORKER TELEWORKER TYPE

Worker Type	2020		2050	
	Percent of Total Workers	Average Daily VMT	Percent Of Total Workers	Average Daily VMT
Full Time Work at Home from Home Office	4%	16.6	3%	15.6
Full Time Teleworker (No Work Trips)	6%	13.3	24%	12.7
Full Time Work from Office (No Telework)	84%	23.6	44%	21.6
Part Time Hybrid Worker (Travel to Office and Work from Home in same day)	7%	27.9	29%	26.1

TABLE 2-10 - MODE OF COMMUTE AND NON-COMMUTE TRAVEL FOR SACOG REGION, 2020 AND 2050

Weekday Commute Trips				Weekday Non-Commute Trips			
Drive Alone	2,178,997	2,352,543	+173,546	Drive Alone	1,854,804	2,487,477	+632,673
Carpool	629,817	648,111	+18,294	Carpool	3,561,877	4,248,634	+686,757
Transit	21,393	31,996	+10,603	Transit	78,534	158,138	+79,604
Bike	65,233	87,197	+21,964	Bike	142,250	203,002	+60,752
Walk	290,447	318,203	+27,756	Walk	589,310	767,625	+178,315
Other	20,501	22,752	+2,251	Other	42,694	46,686	+3,992
Total	3,206,388	3,460,802	+254,414	Total	6,269,469	7,911,562	+1,642,093
Commute Mode Share				Non-Commute Mode Share			
Drive Alone	67.96%	67.98%	0.02%	Drive Alone	29.58%	31.44%	1.86%
Carpool	19.64%	18.73%	-0.92%	Carpool	56.81%	53.70%	-3.11%
Transit	0.67%	0.92%	0.26%	Transit	1.25%	2.00%	0.75%
Bike	2.03%	2.52%	0.49%	Bike	2.27%	2.57%	0.30%
Walk	9.06%	9.19%	0.14%	Walk	9.40%	9.70%	0.30%
Other	0.64%	0.66%	0.02%	Other	0.68%	0.59%	-0.09%

Compact land uses are more effectively served by transit, support potentially higher rates of walking and biking, and generate less vehicle travel. In addition to compact development, the amount of complementary, mixed-use development in the 2025 Blueprint would support higher rates of non-motorized travel and transit use. Table 2-11 provides measures of per capita trips by bicycle, walking, and transit. The table shows that per capita walking, biking, and transit trips would also increase.

TABLE 2-11 - 2025 BLUEPRINT TRANSIT, BICYCLE, AND WALK TRAVEL

Mode of Travel	2020	2050
Weekday Person Trips by Walk/Bike/Transit		
Bicycle Trips	207,483	290,199
Walk Trips	879,757	1,085,828
Transit Trips	99,927	190,134
Population	2,540,353	3,120,053
<i>Bicycle Trips Per Capita</i>	0.08	0.09
<i>Walk Trips Per Capita</i>	0.35	0.35
<i>Transit Trips Per Capita</i>	0.04	0.06
Percent Change in Trips Per Capita from 2020		
Bicycle Trips	---	13.88%
Walk Trips	---	0.49%
Transit Trips	---	54.92%

Source: SACOG 2025.

Land use and Transportation Integration

Land use and transportation relationships are key factors for the performance of the plan. The Blueprint land use forecast and the planned transportation improvements must be paired properly for success of the plan. In particular, the following mobility principles guided the development of the 2025 Blueprint:

- The value of compact development and mixed-use development to support an efficient transportation system and reduce the need for vehicle travel for future residents engaging in work, school, and other activities within the region.
- The necessity of aligning transit services in corridors with sufficient density and concentration of uses in order to support more efficient, productive service.
- The value of providing alternatives to driving alone, including bicycle routes, transit service, and land use patterns that allow for walking to activities near home or work, as an effective way to reduce vehicle travel.
- The value of creating pleasant, high quality pedestrian environments to encourage residents to make more trips by walking.

Table 2-12 and below summarizes the Development Pattern projected by the 2025 Blueprint, sorted by each of the four Ds and by Community Type. In addition, Urban Design 4 Health completed an analysis of the estimated community health and physical activity impacts of the 2025 Blueprint. This analysis, included as Attachment E-1, addresses the connections between land use patterns and transportation and public health related outcomes, such as investments in walkability and greenspace access are more likely to result in healthier populations and a stronger and more reliable workforce. The analysis shows that as the region adds new housing units to support population growth by 2050, more housing units that are closer to employment centers and mixed land uses will likely result in

better health outcomes than placing these housing units in currently undeveloped areas that require costly infrastructure to be developed in a car dependent manner resulting in more sedentary time and less physical activity which are both known to have adverse and costly health impacts.

Regional Accessibility (“Destinations”) would increase by 20 percent overall, with all community types increasing by 20 percent or more relative to 2020. Center and Corridor Communities would have the highest level of regional accessibility in both existing conditions (2020) and in 2050 with implementation of the 2025 Blueprint. —Upon buildout of the 2025 Blueprint growth pattern, accessibility to jobs would be 20 percent higher by car and 186 percent higher by transit for residents of Center and Corridor Communities, compared existing conditions. Accessibility to jobs would decline for the remaining area types, with residents of Rural Residential Communities and Lands Not Identified for Development having the lowest accessibility in both 2020 and 2050, with 70 percent or more below regional averages. This reflects the fact that Center and Corridor Communities are centrally located in the region and are generally surrounded by Established Communities. Developing Communities, Rural Residential Communities, and Lands Not Identified for Development are located on the urban edge or are completely outside the urbanized area. Developing Communities, to the extent they are at the edge of the urbanized area, have access to jobs on only one side. These locational factors drive down regional accessibility and, by extension, drive up VMT generation.

Street Pattern (“Design”) would follow a pattern similar to regional accessibility, with Center and Corridor Communities measuring the highest of all community types in both 2020 and 2050. Overall, the street pattern measure (in this case, intersection density) would increase by 8 percent regionally. Each community type would increase by 4 percent or more.

Mix of Use (“Diversity”) is highest in Center and Corridor Communities and Established Communities, largely because these areas are located near jobs and commercial centers. In 2020, Rural Residential Communities were low in the measured mix of use (17) on the SACOG mix index.¹⁷ In general, measured land mix of use is low in these areas because they are predominantly residential, with very little commercial, school, or other supportive non-residential uses within one-half mile of residences. The biggest change in mix of use between 2020 and 2050 would occur in Developing Communities (43 percent increase). This change reflects a significant amount of growth, especially in non-residential development and schools, in the planning for these areas.

Distance to Transit (“Distance”) is lowest in Center and Corridor Communities, with distance to the nearest transit station or stop averaging approximately 0.22 of a mile per resident in 2020 and experiencing an approximate 3 percent reduction to 0.21 of a mile per resident in 2050. Regional average distance to transit would decrease from 1.04 miles per resident in 2020 to 0.91 miles per resident by 2050. Distance to transit is greatest in Rural Residential Communities, where the average distance to transit is about 2.23 miles per resident (2020).

Residential Density (“Density”) of developed parcels would increase overall by about 25 percent, from an average of 1.2 dwellings per net residential acre to 1.5 units per acre. The biggest change would occur in Developing Communities, where growth as a percentage of 2020 existing development would be high, and significantly higher in density than the baseline because the baseline is rural residential or undeveloped land.

¹⁷ SACOG’s mix index is a variant on an entropy index. It is defined as a residential mix, and measures the degree to which an optimal array of activities and services, which support residents, are present within a one-half mile radius (i.e., 502.6 acres) around the place of residence. The measure includes total jobs per household, retail jobs per household, K-12 school enrollments per household, and medical jobs per household. An area with a perfect balance of each of these factors would score 100; a completely homogenous area, with no mix of use, would score 0.

Established Communities would experience little change because the amount of growth would be relatively small compared to the amount of existing development in 2020. Center and Corridor Communities are both the highest in density and would experience the second most significant change, with an estimated increase from about 11.0 units per net acre to about 15.4 units per acre by 2050.

TABLE 2-12 - KEY LAND USE / TRANSPORTATION CHARACTERISTICS OF THE 2025 BLUEPRINT

Land Use/ Transportation Factor	Community Area Type				
	Center and Corridor	Established	Developing	Rural Residential	Regional Average
2020					
Regional Accessibility ¹ [Auto]	651,028	468,365	297,868	128,977	450,049
Regional Accessibility ¹ [Transit]	35,182	3,442	24	3	6,568
Street Pattern/Urban Design ²	77	54	33	9	50
Mix of Use ³	42	43	30	17	41
Distance to Nearest Transit ⁴	0.22	0.57	1.51	2.23	1.04
Residential Density ⁵	11.0	4.7	1.0	0.1	1.2
2050					
Regional Accessibility ¹ [Auto]	783,502	562,350	362,957	163,295	541,742
Regional Accessibility ¹ [Transit]	100,583	22,252	5,080	464	30,227
Street Pattern/Urban Design ²	88	58	35	10	54
Mix of Use ³	52	48	43	18	46
Distance to Nearest Transit ⁴	0.21	0.51	1.02	2.17	0.91
Residential Density ⁵	15.4	4.9	3.8	0.1	1.5
Change from 2020					
Regional Accessibility ¹ [Auto]	20%	20%	22%	27%	20%
Regional Accessibility ¹ [Transit]	186%	546%	21067%	15367%	360%
Street Pattern/Urban Design ²	14%	8%	8%	4%	8%
Mix of Use ³	24%	12%	43%	6%	12%
Distance to Nearest Transit ⁴	-5%	-11%	-32%	-3%	-13%
Residential Density ⁵	40%	4%	280%	0%	25%
<i>Notes: All numbers are averages for residences in each community area type across the region.</i>					
¹ Total jobs within 30-minute travel time from place of residence to jobs; for drive, times based on AM peak period roadway times for transit, travel times include estimates of average walk to first station/stop, average wait time, line haul times, transfer times (if any), and walk time to final destination.					
² Intersection density, stated as intersections per square mile, within 1/2 mile of place of residence.					
³ SACOG entropy index, 0 to 100 scale with 0 = low, 100 = best mix of use. The land use diversity index measures an area's ratio of households compared to amenities including total jobs, K-12 enrollment, and employment in the retail and service sectors, within 1 mile of residence by community type.					
⁴ Shown as distance from place of residence to nearest transit station or stop, in miles per resident.					
⁵ Dwelling units per net residential acre, within 1/2 mile of place of residence.					
Source SACOG 2025					

Vehicle Miles Traveled

Table 2-13 shows VMT by three sources in the region for 2020 and 2050: household-generated, commercial vehicle, and external.

Household-generated, which includes all travel by residents of the region for work, school, shopping and other household purposes, accounts for almost three-quarters of all VMT. Household-generated VMT per capita is projected to decrease from 17.1 miles in 2020 to 15.9 miles by 2050, a decrease of 7.5 percent.

Commute travel includes all travel by workers from home to work and back home, including any intermediate stops for other non-work activities (e.g., to drop off a child at school, to shop, or to attend to personal business). It accounts for about 50% of total household-generated VMT.

Commercial vehicle travel includes vehicles of all types which are transporting services or goods on roadways within the SACOG region. This source of VMT is not just bigger, multi-axle trucks—it includes transportation of services (e.g. office equipment repair, plumbers, home delivery) which may use smaller vans or even passenger vehicles, as well as small-to-medium sized trucks.

Combining all sources of VMT, including external and through-travel VMT, forecasted VMT per capita declines from 23.8 miles to 22.6 miles from 2020 to 2050, a 5.3 percent decrease.

TABLE 2-13 - VEHICLE MILES TRAVELED BY SOURCE IN SACOG REGION 2020 AND 2050

Variable	2020	2050
Weekday VMT by Source		
Household-Generated Commute VMT ¹	21,843,600	22,786,700
Household-Generated Other VMT ¹	21,676,400	26,669,600
Total Household-Gen. VMT ¹	43,520,000	49,456,300
Commute Share of HH-Gen VMT	50%	46%
Commercial Vehicle VMT ²	9,854,900	12,404,000
Non-resident VMT ³	4,957,100	5,130,700
Through-Travel VMT ⁴	2,176,600	3,420,400
Total VMT	60,508,600	70,411,300
Per Capita or Per Job Rates		
Population	2,540,400	3,120,100
Jobs	1,022,700	1,285,700
Household-Generated VMT per Capita	17.1	15.9
Commercial Vehicle VMT per Job	9.6	9.6
Total VMT per Capita	23.8	22.6
Percent Changes in VMT Per Capita or Per Job, compared to 2020		
Household-Generated VMT per Capita		-7.5%
Commercial Vehicle VMT per Job		0.1%
Total VMT per Capita		-5.3%
¹ Household-generated VMT is travel by households within the SACOG region, plus travel within the SACOG region by households outside the region. Total household-generated VMT is split into commute (i.e., all VMT generated by workers going from home to work and back, with any stops along the way), and other (all non-commute).		
² Commercial vehicle VMT is cumulative vehicle travel for moving goods, services and freight within the region. It includes commercial travel in passenger vehicles, light trucks, and vans as well as larger trucks.		
³ Non-resident VMT is vehicle travel from residents outside the region travel within the region to destinations inside the region. Such as air and passenger vehicle visitors.		
⁴ Through-travel VMT is all travel on roadways passing through the SACOG region.		

Source: SACOG 2025.

Even with the expected decrease in VMT per capita that is predicted in 2050, the increase in population and total VMT will mean more vehicles on the road. This overall increase in travel has the potential to increase congestion in the region. The 2025 Blueprint aims to minimize congested roadways by 2050 in three ways; 1) targeting capacity investments where traffic bottlenecks occur; 2) providing options to take non-driving modes and reducing vehicle

demand during peak travel hours; and 3) providing express lanes in some congested corridors, allowing more travelers access to less congested facilities.

Table 2-14 shows congested VMT¹⁸ in the SACOG region. Household-generated congested VMT per capita increases from 0.9 to 1.0 between 2020 to 2050. Regional total congested VMT per capita, which includes external travel and commercial vehicle, also increases from 1.17 and 1.27 between 2020 and 2050. Although still an increase, this change is minor compared to the growth in jobs and population projected over the same period.

TABLE 2-14 - CONGESTED VEHICLE MILES TRAVELED BY SOURCE IN SACOG REGION 2020 AND 2050

Variable	2020	2050
Weekday Congested VMT (CVMT) by Source		
Household-Generated Commute CVMT ¹	1,303,500	1,638,700
Household-Generated Other CVMT ¹	909,100	1,513,200
Total Household-Gen. CVMT ¹	2,212,700	3,152,000
Commute Share of HH-Gen CVMT	59%	52%
Commercial Vehicle/Non-resident Internal/Through-Travel CVMT ²	752,300	815,600
Total CVMT	2,964,900	3,967,500
Per Capita or Per Job Rates		
Population	2,540,400	3,120,100
Household-Generated CVMT per Capita	0.9	1.0
Total CVMT per Capita	1.17	1.27
Percent Changes in CVMT Per Capita or Per Job, compared to 2020		
Household-Generated CVMT per Capita		16.0%
Total CVMT per Capita		9.0%
¹ Household-generated CVMT is cumulative vehicle travel by residents of the region traveling within the region. It includes commercial travel in passenger vehicles, light trucks, and vans as well as in larger trucks.		
² Commercial vehicle CVMT is cumulative vehicle miles travelled for moving goods, services and freight within the region. It includes commercial travel in passenger vehicles, light trucks, and vans as well as in larger trucks. Externally generated VMT is cumulative vehicle travel from residents outside the region, but who travel to destinations within the region, or travel through the region.		

Source: SACOG 2025

Moreover, Table 2-15 further breaks down VMT growth at the county level.

¹⁸ Household-generated CVMT is cumulative vehicle miles travelled by residents of the region on roadways which are at-or-above capacity, for their travel within the region. Household-generated CVMT is split into commute and other shares.

TABLE 2-15 - COUNTY ROADWAY VEHICLE MILES TRAVELED

County	Daily VMT ¹		Changes	
	2020	2050	#	%
El Dorado	4,040,914	4,291,950	251,036	6.2%
Placer	10,431,317	12,801,679	2,370,362	22.7%
Sacramento	35,334,548	40,719,441	5,384,893	15.2%
Sutter	2,471,593	2,868,322	396,729	16.1%
Yolo	6,330,926	7,544,320	1,213,394	19.2%
Yuba	1,899,329	2,185,604	286,275	15.1%
Region	60,508,627	70,411,316	9,902,689	16.4%
Population	2,540,353	3,120,053	579,700	22.8%
Roadway VMT per Capita	23.8	22.6	-1.3	-5.3%

Source: SACOG, 2025.

¹ Includes roadway VMT of the SACOG region, for travel within the region. Estimates and forecasts from SACSIM regional travel demand model.

² The numbers shown here may differ slightly from those reported in the EIR due to the incorporation of public comments and minor network edits.

Source: SACOG, October 2025.

Greenhouse Gas Emissions

The assumptions and indicators described in the 2025 BLUEPRINT offer the best path to achieving the 19 percent per capita greenhouse gas (GHG) emissions reduction target assigned to SACOG by the California Air Resources Board (CARB). Table 2-16 provides the bottom-line calculation of the GHG reduction, which is subject to review of CARB, upon adoption of the SCS by SACOG. A more detailed breakdown of the GHG reduction is provided in Table 2-17 below.

TABLE 2-16 - SB 375 GREENHOUSE GAS EMISSIONS REDUCTION

Performance Metric	2005 Baseline	2035	% of Reduction
Weekday passenger vehicle CO2 emissions, lbs. per person per day, percent change per capita from 2005	23.2	18.4	>19%

The SB 375 GHG emissions reduction target is unique, in that the base year (2005) and horizon year (2035) are different than the base year and horizon year for the proposed 2025 Blueprint, and the formula for calculating the reduction is very complicated. All aspects of the target are determined by the California Air Resources Board (CARB). Several fundamentals of the calculation are worth noting, though. The calculation is based on vehicle activities forecasted by SACSIM23 travel demand model, with vehicle fleet forecasts and emissions calculated using

versions of the state's EMFAC emissions models¹⁹. Both models [SACSIM23 and EMFAC11] are required to calculate the target, with EMFAC being used as a post-process to each SACSIM23 model run needed to calculate the emissions. In short, it is difficult to isolate the individual effects of 2025 Blueprint factors because they work in concert to contribute to the overall GHG reduction.

Given these limitations, though, there is a strong interest in understanding the connection between the target and specific factors and effects that are included in the proposed Blueprint. Table 2-17 provides an approximate performance of these factors and effects individually.

TABLE 2-17 - BREAKDOWN OF SB 375 GHG REDUCTION FACTORS

	Approx. GHG Reduction % (2035-2005)
<i>2025 BLUEPRINT Policy & Program – Related Factors</i>	
Increased Increase in Transit, Bike & Walk Trip Share	5%
Shortened Vehicle Trips and Increase in Carpooling	5%
Pricing	1.5%
ITS & TSM	+/- 0.5%
Local EV Programs	+/- 0.5%
<i>Exogenous Factors</i>	
Aging Population	1%
Increase in Auto Cost	2.5%
Increase in Telework	3%
Total Reduction	+/-19%

Source: SACOG, 2025.

For the factors related to the policies and programs of the 2025 Blueprint, the approach to estimating the approximate share of the GHG reduction are described below.

- For increased Non-SOV mode share, the trip length and increase in trip rate for transit, bike and walk trips was calculated for year 2005 and year 2035 and the increase in person miles traveled by these modes was used to calculate the share for modeled travel. To this share was added an off-model increment for transportation demand management programs, and a small share for increased micro-mobility use.
- For shortened vehicle trips, the average trip length for all auto mode trips [SOV and carpool], and the decrease in average trip length was used to calculate a share of GHG reduction.

¹⁹ In setting the original SB 375 targets in 2010, CARB was very careful to focus the target on factors related to land use, transportation, and reduction in VMT, rather than changes to the vehicle fleet, power sources, fuels, etc. The fleet and fuel factors were the focus areas of statewide programs. In order to focus SB 375 on land use, transportation and VMT reduction, a special set of emission rates were added to EMFAC, that factor out the changes related to the state fleet and fuel programs, and those rates are used by all MPOs for SB 375 implementation purposes.

- For facility pricing, and mileage-based fees, the additional cost of auto travel for both programs were calculated as an average related to a non-priced alternative, and the increment was translated into a VMT impact using a VMT elasticity.
- For ITS and TSM, the impact of more robust deployment of these programs, relative to 2005.
- For the impact of local EV deployment programs, which are locally funded programs to increase the rate of EV market penetration within the SACOG region were qualitatively assessed, and translated into percentage change in GHG, over-and-above the much larger state programs.

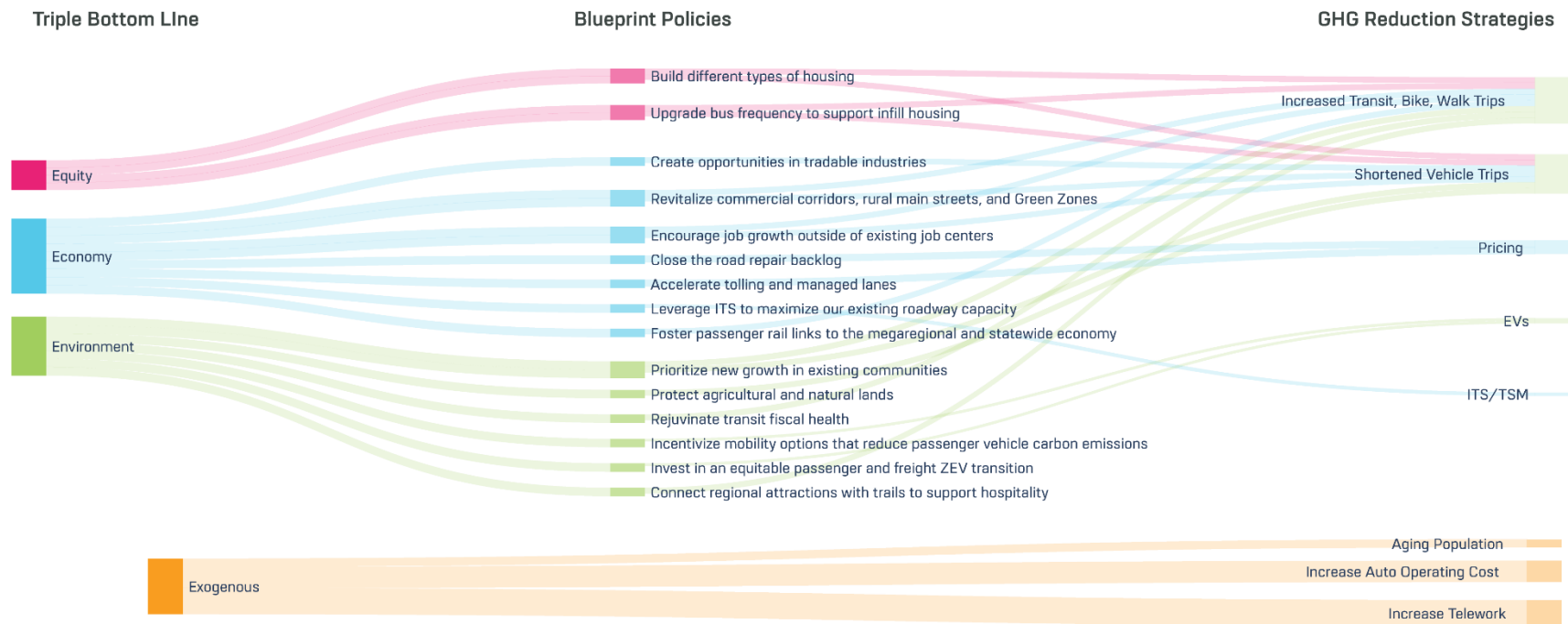
The SB 375 GHG emissions reduction also includes factors that have little to do with the proposed 2025 BLUEPRINT in terms of implementation. These factors that are largely outside the control of MPOs or their local member agencies are often labeled “exogenous” factors. Three major exogenous factors affecting GHG emissions are:

- Aging population—the share of persons 65-years-or-older is forecasted to increase from 16 percent today to 19 percent by 2050. Older persons travel less, and generate less VMT and GHG emissions from that travel, than younger persons.
- Increase in auto cost—the basic cost of operating an automobile was forecasted to increase over the timeline of the proposed 2025 BLUEPRINT, and this increase accounts for a part of the GHG reduction. This increase is based on forecasted cost of fuel, changes to the efficiency of the passenger vehicle fleet, and changes to the non-fuel operating costs like tires, maintenance and repair, averaged to a per-mile cost. This part of the vehicle cost excludes “policy” costs like facility-based pricing, and PAYGO fees.
- Increase in Telework- since the Covid-19 pandemic, telework has increased as a more common way to work. Some telework schedules such as hybrid schedules during a day actually increase VMT, however as a whole telework increase in the work place has shown a decrease in overall VMT as well as alleviation of peak congestion times which overall decreases VMT. Number of workers tele commuting has decreased since 2020 but recent data shows a stabilization of teleworkers.

The fact that a part of the 19 percent GHG reductions is generated by exogenous factors, rather than policies or programs of the 2025 BLUEPRINT, is not new. When the SB 375 targets were set in 2010, those factors were part of the calculation of the targets, and that fact was re-confirmed when the targets were re-set by CARB in 2018.

Many “factors” driven by specific policies and actions included in the Blueprint. The complex relationship between the many specific policies and actions, the grouped “factors” for which GHG reductions were approximated above, and how they tie back to the triple bottom line of equity, economy and environment is provided in Figure 2-11.

FIGURE 2-11 - 2025 BLUEPRINT POLICIES AND ACTIONS CONTRIBUTING TO GHG REDUCTION



Section 3: Equity Analysis

Introduction

The 2025 Blueprint, or the plan, is a regional vision that can help local jurisdictions create a high quality of life for their local community. High quality of life has many components and is different for many people, but the built environment plays a big role in shaping people's lives. The environment and local infrastructure impacts how people get around and access important destinations, the ability to get to work, run errands, and/or go out for fun comfortably. And the ability to do these things in a timely manner by walking, biking, or taking transit has a significant impact on overall health and quality of life.

On the land use side, the plan seeks to create economic opportunities for all residents, provide housing options for all incomes and life stages, create investment in existing communities, build complete communities, support safe and convenient transportation options, prepare for natural disasters to protect people and property and preserve farmland and open space. On the transportation side, the plan envisions a region where instead of gridlock, we have movement; there is strategic expansion of our roadway and transit networks; more efficient roads through improved design; and incentives for motorists to change the way they use our highways. The plan aims for safer roads, preventing injuries and deaths from accidents and less air pollution and emissions of greenhouse gases that put our climate and local health at risk.

Regional data show that not all residents drive, walk, bike, or take transit at the same rate. For instance, rates of car ownership vary by income level. Individuals and families need a variety of safe and reliable transportation options to get and hold a job, go to a grocery store, access daycare facilities and schools, and access key services, like going to the doctor.

Guided by the triple bottom line framework and federal and state performance measures, the 2025 Blueprint gives SACOG an opportunity to assess how plan outcomes perform across different social, environmental, and economic factors. Federal and state policy continue to require attention to delivering equitable infrastructure investments in both underserved urban and rural communities. For example, US DOT, through DOT Order 2100.7, has updated agency implementation principles for enhancing transportation benefits and minimizing adverse impacts:

- Benefits may include but are not limited to, economic opportunities, such as increased access to jobs, healthcare facilities, recreational activities, commercial activity or any actions or project components that will help alleviate poverty, enhance safety, and primarily benefit communities by improving the quality of their lives, raising their standard of living, or enabling them to participate more fully in our economy; and
- Adverse impacts may include but are not limited to, noise, water pollution; soil contamination; denial of or a reduction in transportation services; increased difficulty in raising children in safe and stable environment; and destruction or disruption of community cohesion, safety, or economic vitality.

At the state level, California legislation such as SB 115, SB 535, SB 1000, and AB 1550, continues to set standards for policy regarding state environmental justice efforts and disadvantaged communities. Several state funding programs, including all SB1-funded programs, require information regarding projects impacts to Disadvantaged Communities (DACs), as defined by CalEnviroScreen, which include tribal lands. Several state programs include tribal funding set-asides, and there are federal programs, such as the Tribal Transportation Programs, that specifically address the transportation needs of federally recognized Tribal governments.

Of particular emphasis, AB 686 requires all public agencies to ensure that their housing and community development programs and activities, taken together, affirmatively further fair housing (AFFH), and that they take no action materially inconsistent with this obligation. Affirmatively furthering fair housing is defined as taking proactive and meaningful actions, in addition to combating discrimination, that overcome patterns of segregation and foster inclusive communities free from barriers that restrict access to opportunity based on protected characteristics.

SACOG's vision and commitment to affirmatively furthering fair housing throughout the region is a central theme of the policies and programs as outlined in the 2025 Blueprint. Chapter 3 of the plan acknowledges that most of the region's housing stock is characterized by single-family homes, which are also generally located in some of the region's highest opportunity census tracts. In these areas, the overwhelming presence of single-family homes has a two-fold effect of restricting access to opportunity for households who cannot afford a single-family home and indirectly reinforces disparities due to wealth gaps between different demographic groups. For many communities of color, the wealth gap in housing spans across generations and neighborhoods comprised of predominantly single-family homes may also perpetuate exclusive, segregated communities.

SACOG's call to action in the 2025 Blueprint (particularly through policies **Vibrant-3**, **Vibrant-5**, **Vibrant-6**, **Vibrant-7**, and **Vibrant-8**) emphasize housing mobility, economic development, anti-displacement measures, and actions that will facilitate the transformation of racially or ethnically concentrated areas of poverty and affluence to more vibrant, inclusive neighborhoods.

Initiatives like the "Mind the Gap" framework encourage local governments to upzone to higher densities, facilitate a wider variety of housing types, including missing middle and Accessory Dwelling Units (ADUs), and implement tenant-based protections and prioritize the preservation of existing affordable housing. Strategic, targeted investments with community-led, place-based strategies are transforming racially and ethnically concentrated areas of poverty into areas of opportunity through SACOG's Green Means Go, Engage, Empower, and Implement, and Mobility Zones Projects. Funding for infill housing and infrastructure improvements in historically underserved areas of the region are key goals of these programs.

Further, SACOG employs its land use forecast to guide the region's future growth, identifying areas where more housing options at a range of affordability levels and household types is needed to meet the needs of the region's youth, young adults, students, seniors, and workforce. A core component of the land use forecast is to support the construction of more small-lot and attached housing in walkable neighborhoods with proximate access to high-quality jobs, good schools, open spaces, and easy access to public transportation. SACOG strives to both meet legal requirements and support our local jurisdictions in improving the lives of their residents. To meet both these goals, this analysis includes additional metrics beyond those outlined in state and federal law. While the information in this analysis should be used to better understand how the plan impacts communities across the region, it is important to keep in mind that this information does not tell the whole story of our region and its communities. This technical information is a starting place for interagency and community partnerships that can clarify detailed and nuanced local community needs.

Analysis Parameters

To ensure the 2025 Blueprint's strategies and benefits support all communities, this Equity Analysis measures the outcomes in specific geographic areas and the region as a whole. SACOG chose to analyze plan performance in the following geographic areas:

Areas of Persistent Poverty Census tracts – Any county with 20+ percent of the population below the poverty line for 30+ years, any census tract with 20+ percent in poverty in the 2014-2018 American Community Survey ([ACS](#)) 5-year data [table C17002], and any U.S. territorial possession.

High Birth Rate areas and High Marriage Rate areas – Census tracts where marriage rates are higher than national average. The results were estimated using 2019-2023 American Community Survey ([ACS](#)) 5-year data [tables B12002 and B13016]. Census tracts where birth rates are higher than national average. The results were estimated using 2019-2023 American Community Survey ([ACS](#)) 5-year data [tables B12002 and B13016].

CalEnviroScreen 4.0 - Top 25th Percentile [CES4.0] – [CalEnviroScreen](#) is a screening tool that evaluates the burden of pollution from multiple sources in communities while accounting for potential vulnerability to the adverse effects of pollution. CalEnviroScreen ranks census tracts in California based on cumulative impacts from pollutants, adverse environmental conditions, socioeconomic factors and prevalence of certain health conditions. Data used in the CalEnviroScreen model comes from national and state sources.

Equity Priority Communities [EPC] – Equity Priority Communities are the foundation of SACOG’s Mobility Zones project, which aims to prioritize investments in communities that have been historically marginalized or underserved by transportation decisions. Criteria and methodology can be found [here](#). EPC’s are Census block groups that have higher concentrations of demographic characteristics than other areas within the same county. Unlike some other state and federal equity maps, EPCs were developed in partnership with community members. The EPC methodology weighs demographic characteristics differently in each county, depending on which characteristics were important to different communities. Input from the project’s Community Committees and a regional public survey were used to assign unique weights to the Equity criteria for each county.

Tribal Lands – Federally recognized tribal lands in the region as designated by the Bureau of Indian Affairs. There are four federally recognized tribes that share geography with the SACOG region: Yocha Dehe Wintun Nation [formerly Rumsey Rancheria], Wilton Rancheria, Shingle Springs Band of Miwok Indians, and United Auburn Indian Community.

This analysis assesses demographics, changes in transit access to a variety of destinations, including jobs, medical services, higher education, and travel and active transportation across these geographies through comparison of the plan base year [2020] and plan horizon year [2050]. For additional discussion and fuller analysis of health indicators related to plan implementation, see Attachment E-1 [2025 Blueprint Health Indicators].

Demographic factors assessed include:

- Percent nonwhite
- Median household income
- Share of zero-vehicle households
- Vehicle Miles Traveled [VMT] per capita

Accessibility metrics assessed include:

- Access to jobs within a 30-minute transit trip or drive
- Access to major medical facility within a 30-minute transit trip
 - For this analysis, medical facility is narrowly defined as an existing hospital or major medical office complex.
- Access to a college or university within a 30-minute transit trip
- Physical activity through active transportation

- Defined as the number of people in the region who get at least 30 minutes of physical activity from taking trips by biking or walking.

Data and Analysis Limitations

While all of the areas identified in the methodology outlined above and shown in the profiles below are included for purposes of this analysis, the data and analysis are not perfect. Methodological details and data limitations to keep in mind include the following:

- A full explanation of the criteria used and methodology for the Mobility Zones Equity Priority Communities can be found on the project website: (<https://www.sacog.org/planning/transportation/mobility-zones/>)
- The healthcare access measure used in this analysis is access to a major medical facility, rather than to medical services. A person is considered to “have access” to a hospital if they have access to 1 or more parcels whose land use type is “Medical Facility”, which generally refers to hospitals.
- It is currently not possible to measure or forecast each resident’s access to medical services due to the range of providers available, the fact that residents may or may not have an applicable health or dental insurance plan for a nearby facility, and/or be able to afford co-pays or direct fees for service.
- Higher education is defined as public universities and colleges, including all the region’s community colleges and satellite campuses (but not adult schools, GED, remediation, or vocational training programs that serve targeted populations).
- Job access and higher education access only represent physical access to jobs and educational institutions. For higher educations, a person is considered to have access to education if they have access to 1 or more parcels whose land use type is “College/University.” This measure and analysis do not capture whether residents have the required skills for the job, nor does it consider how competitive jobs are (e.g., the total number of workers may be significantly greater than the number of jobs available). On the education side, it does not consider whether residents have necessary qualifications to attend or the needed resources (e.g., a person may be able to physically access a university but not have the means to pay for tuition).
- The physical activity measure only looks at physical activity specifically walking and biking trips, notably it does not include the walking someone might do to get to and from a bus stop or light rail station. Additionally, this metric does not capture other ways residents may reach the recommended 30-minute threshold, such as going to a gym, participating in organized sports, recreational walking or biking, or doing household chores or yardwork.
- Birth rates were calculated by dividing the population of women aged 15-44 who had at least one birth by the total population then multiplying by 1,000, giving the share of the population who gave birth to one or more children during the ACS survey period. This is an approximate estimate of the number of births per 1,000 population but is likely a low estimate given that some women will give birth to more than one child during the survey period.
- Marriage rates were calculated by dividing the population aged 18-44 that is “now married” by the total population. This technically represents the percentage of people that are married. The data needed to calculate actual marriage rates is not available at the census tract level [table B12501].
- Accessibility is based on a combination of travel time by transit and driving, which comes from the SACSIM travel model and land use data generated through SACOG’s land use forecasting methodology.
- VMT per capita and minutes of physical activity based on outputs are from the SACSIM travel model.
- Demographic data [i.e., zero-vehicle households, race/ethnicity, and household income] come from SACOG’s population forecasting process.

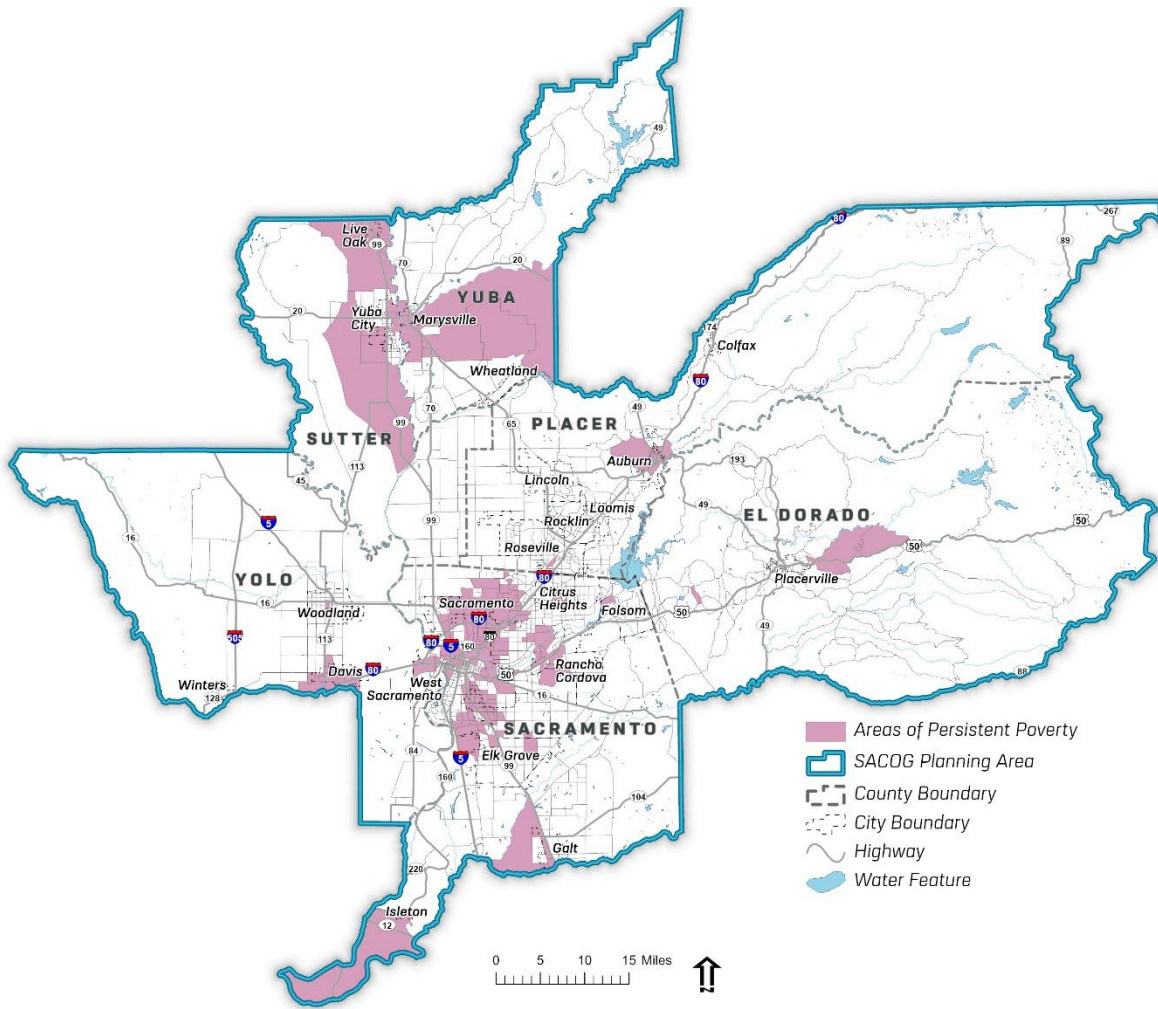
- The tribal land dataset comes from the Bureau of Indian Affairs and only includes federally recognized tribes. Tribally controlled land is mapped to the parcel level for all Land Area Codes (LAC) held in trust or restricted-fee by the United States.
- Census data for households on tribal lands may not accurately reflect the actual number of people residing there. The US Census Bureau includes the American Indian/Alaska Native population under the agency's description of "Hard-to-Count," communities, i.e., those for whom traditional methods of counting may not be sufficient to fully include them in the census. In addition, Tribal enrollment data is protected due to tribal sovereignty and privacy concerns; it is considered internal tribal government data and is not generally accessible to the public.

Geographic Area Profiles

Areas of Persistent Poverty

The definition of persistent poverty for this analysis is taken from the U.S. Census Bureau. The federal dataset on Areas of Persistent Poverty identifies regions in the United States that have experienced high poverty rates over extended periods (either at the county or census tract level). This characterization is one of several viable definitions and SACOG takes no official position on how to define persistent poverty. There are no counties in the SACOG Region that meet the definition of persistent poverty; however, there are 185 census tracts that qualify as areas of persistent poverty, as seen in Figure 3-1.

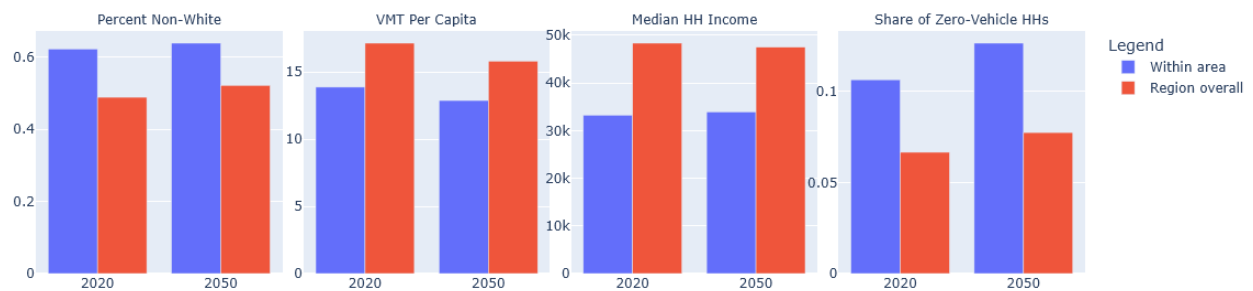
FIGURE 3-1 - AREAS OF PERSISTENT POVERTY



Demographic in Base and Horizon Years

As seen in Figure 3-2, in both the plan base year [2020] and plan horizon year [2050], areas of persistent poverty have higher shares of non-white residents and lower-income households as compared with the region overall. These areas also have more households who do not own a car. Fewer households with cars contribute to these areas having lower VMT per capita compared to the region.

FIGURE 3-2 - DEMOGRAPHIC FACTORS IN AREAS OF PERSISTENT POVERTY ON BASE AND HORIZON YEARS



2025 Blueprint Plan Performance in Areas of Persistent Poverty

If this plan is implemented, accessibility to jobs, education, and hospitals improves for people living in areas of persistent poverty in the SACOG region, with the biggest improvement seen in jobs accessible by transit. As these areas are home to more individuals without access to a household vehicle, this improvement is of particular benefit, providing greater economic opportunity and fuller participation in the regional economy. Performance highlights, as seen in Figure 3-4, include the following:

- The average resident will have access to nearly 40,000 more jobs by transit, or +330% more than they can currently access. Residents will also see an increase in access to jobs within a 30-minute commute by car.
- The percentage of residents who can travel to a college or university on a 30-minute transit trip more than doubles by the horizon year.
- This geography sees an increase of over 150% in the number of community members with access to a major medical facility within a 30-minute transit ride.
- This geography sees a modest increase in the amount of people getting at least 30 minutes of physical activity through walking or biking to get around (roughly 39,000 people; the total population in this geography is expected to increase by 168,000 by 2050).

FIGURE 3-3 - ACCESSIBILITY METRICS IN AREAS OF PERSISTENT

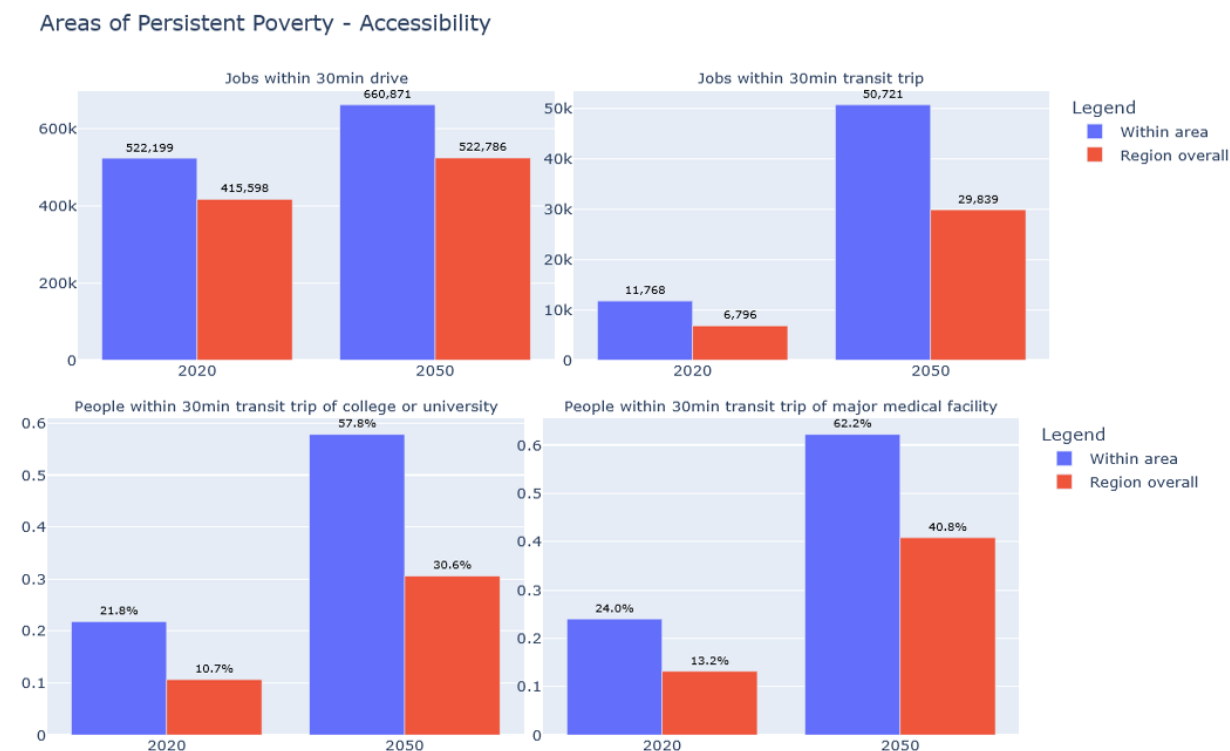
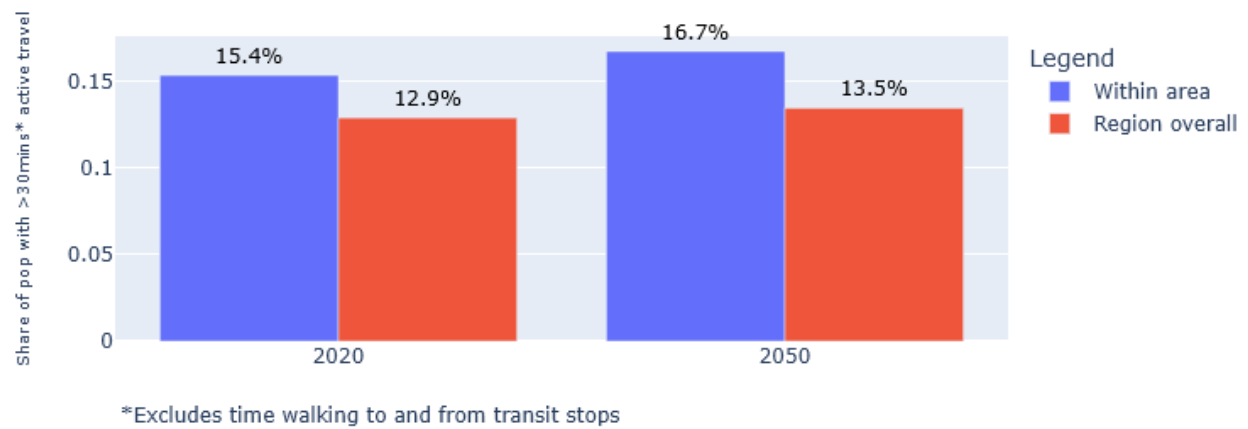


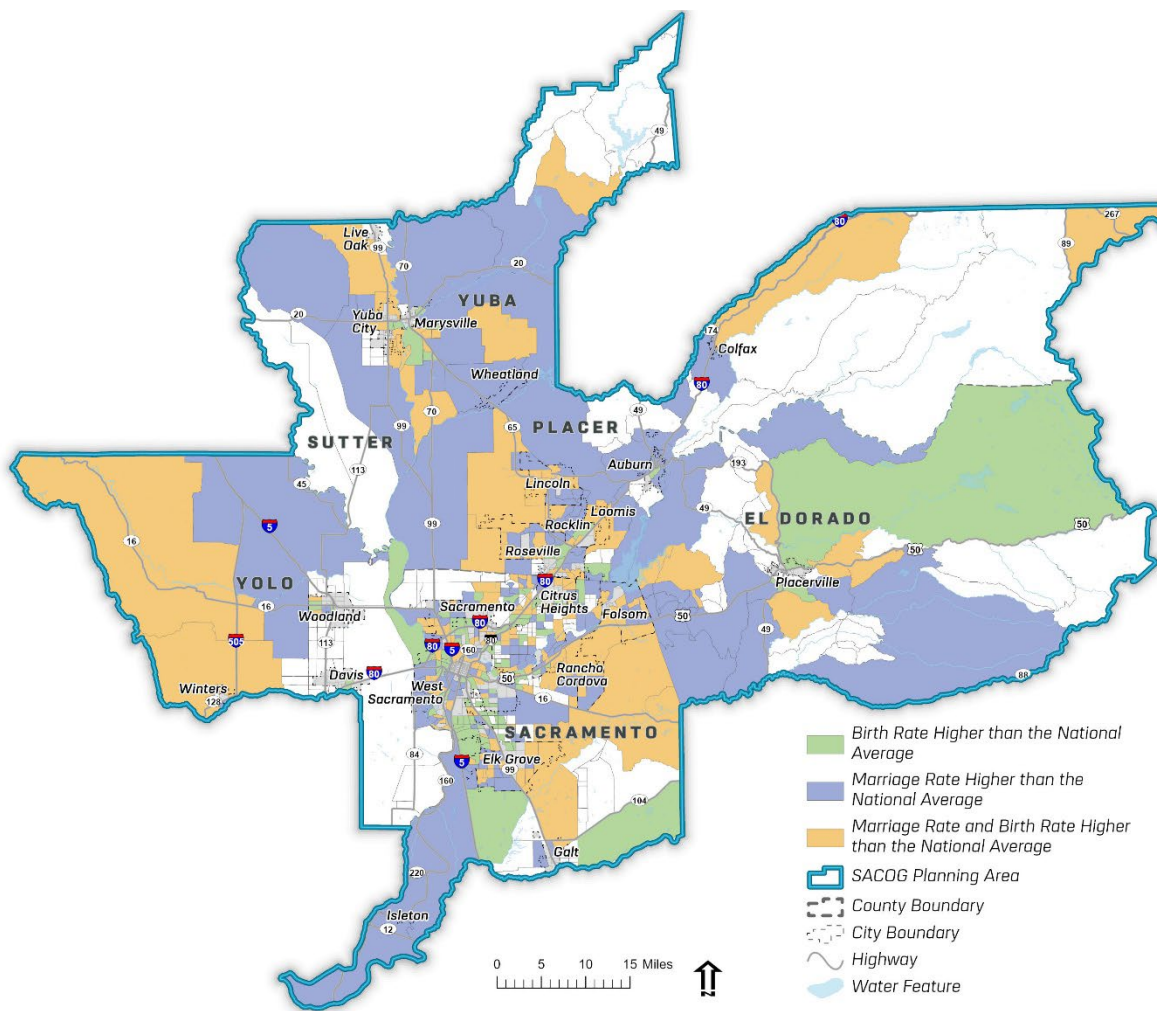
FIGURE 3-4 - ACTIVE TRAVEL IN AREAS OF PERSISTENT POVERTY



High Marriage and High Birth Rate Areas

Looking at high marriage and birth rates is a stated priority of US DOT to ensure appropriate funding and adequate resources, including the accessibility of transportation, are given to families. By identifying high birth rates in the region, it is possible to better understand where local families are growing. The 2025 Blueprint population projection shows significant population increases in the region over the next 25 years, with natural increase making up about half of projected growth. As Figure 3-5 shows, there are census tracts across the region where birth and marriage rates are higher than the national average, making planning for the transportation needs of children, youth, and families critically important.

FIGURE 3-5 - AREAS WITH ABOVE AVERAGE BIRTH AND MARRIAGE RATES



Demographics in Base and Horizon Years

When looking at demographic factors for marriage and birth rates separately, we see a slight increase of non-white populations in both geographies when comparing the base year [2020] and the horizon year [2050], see Figures 3-6 and 3-7. Both above average marriage and birth rate areas are expected to experience reduced vehicle miles traveled per average person when compared from the base year of [2020] to horizon year [2050]. Both areas are

expected to experience an increase in the share of households without a car. As transit access expands over plan implementation, fewer households will need vehicles to meet their transportation needs. The available data on income suggests these areas will not have major shifts.

FIGURE 3-6 - DEMOGRAPHICS IN AREAS WITH ABOVE AVERAGE BIRTH RATES

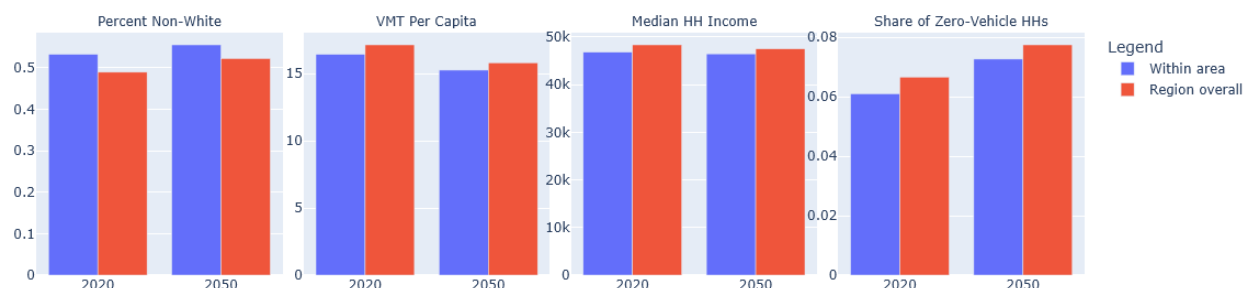
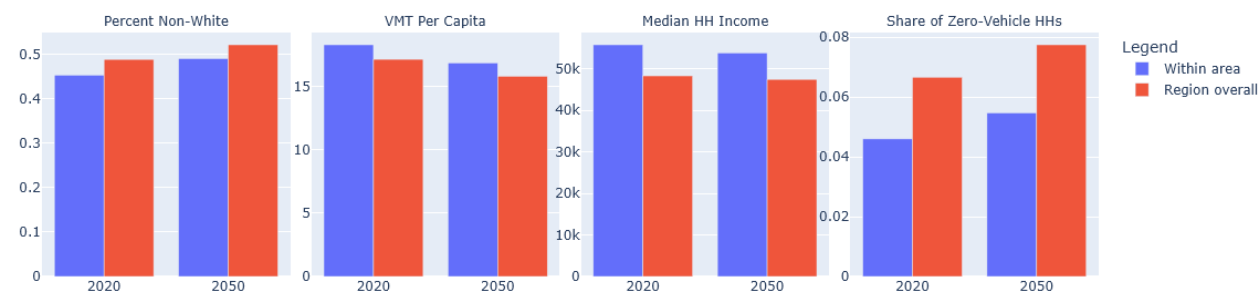


FIGURE 3-7 - DEMOGRAPHICS IN AREAS WITH ABOVE AVERAGE MARRIAGE RATES



2025 Blueprint Plan Performance in High Marriage and High Birth Areas

If the plan is implemented, areas with higher-than-average rates for marriage and births will see a significant increase in access to resources, as seen in Figures 3-8 and 3-9. Jobs within a 30-minute drive will have modest increases, with jobs within a 30-minute transit trip seeing the most significant jump. When looking at access to schools and major medical facilities, both driving access and transit access significantly increase, making these resources more available to residents in those areas.

FIGURE 3-8 - ACCESSIBILITY METRICS IN AREAS WITH ABOVE AVERAGE BIRTH RATES

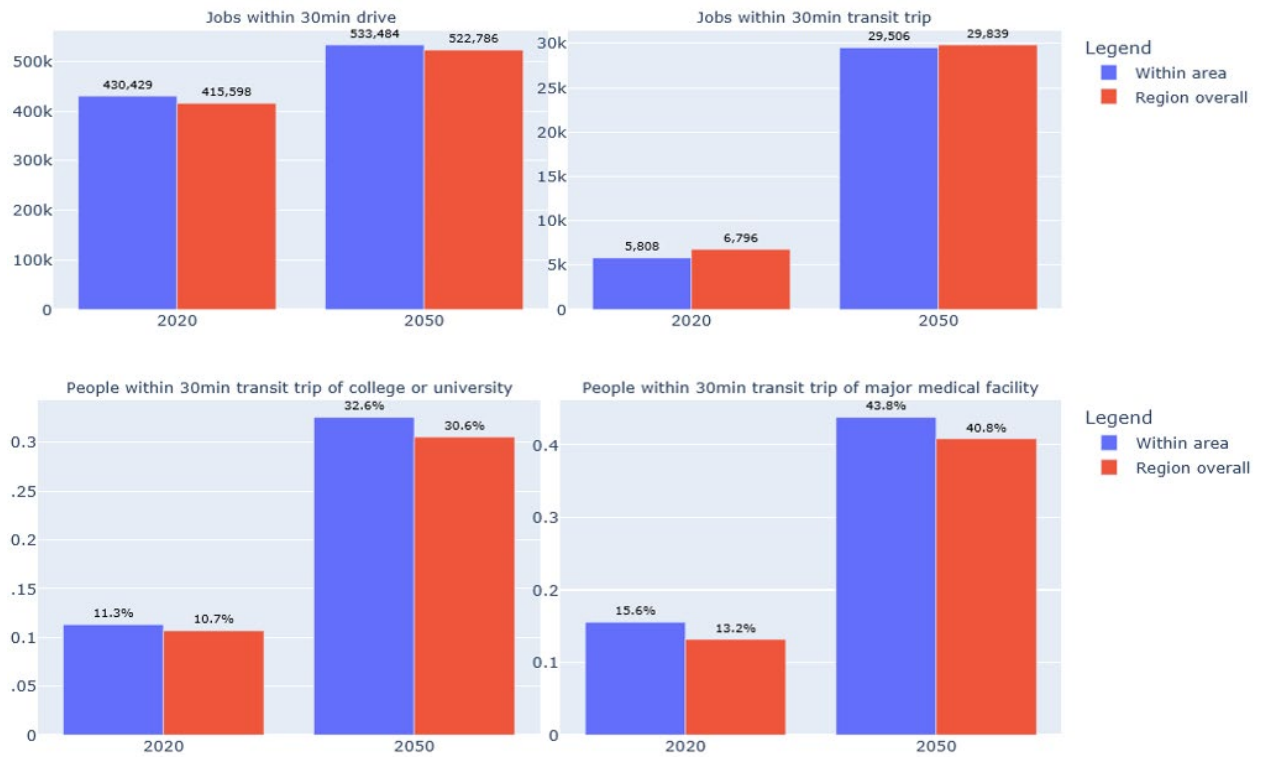
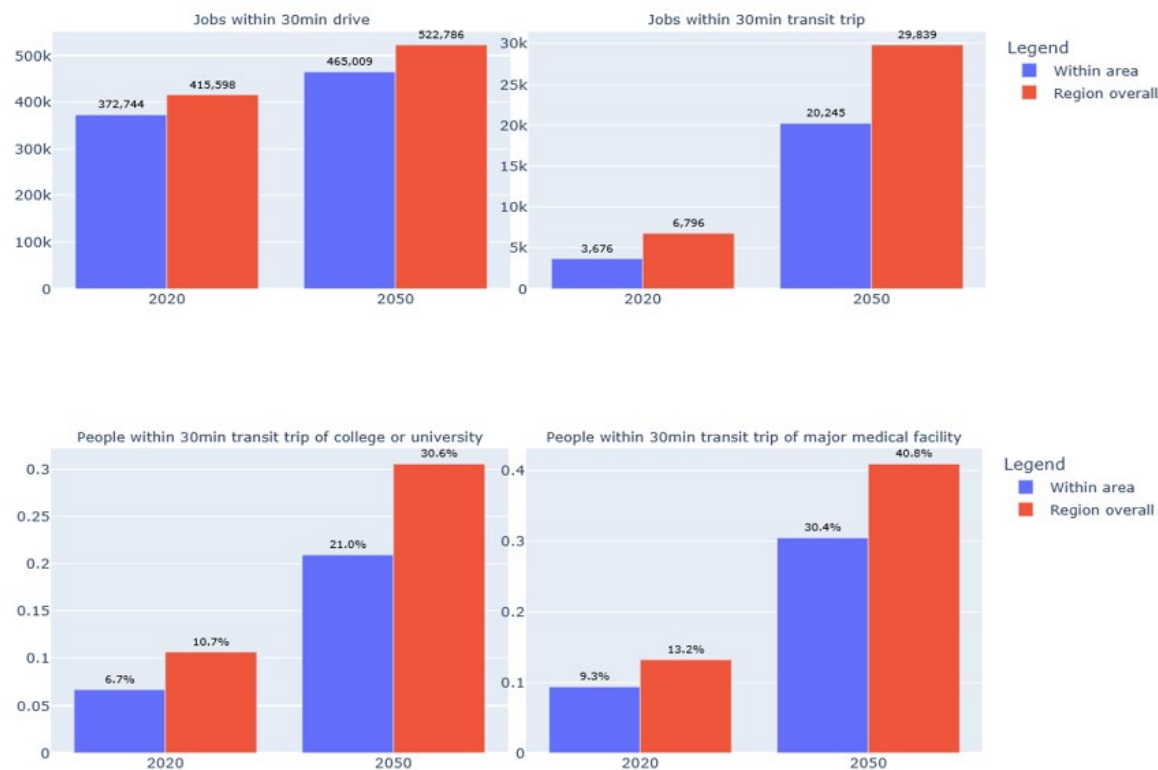


FIGURE 3-9 - ACCESSIBILITY METRICS IN AREAS WITH ABOVE AVERAGE MARRIAGE RATES



The areas with above average rates of marriage and births will see slight increases in physical activity, as seen in Figures 3-10 and 3-11, with data looking at 30 minutes or more of active travel (walking). These rates may be higher due to the exclusion of time walking to and from transit stops.

FIGURE 3-10 - ACTIVE TRAVEL IN AREAS WITH ABOVE AVERAGE BIRTH RATES

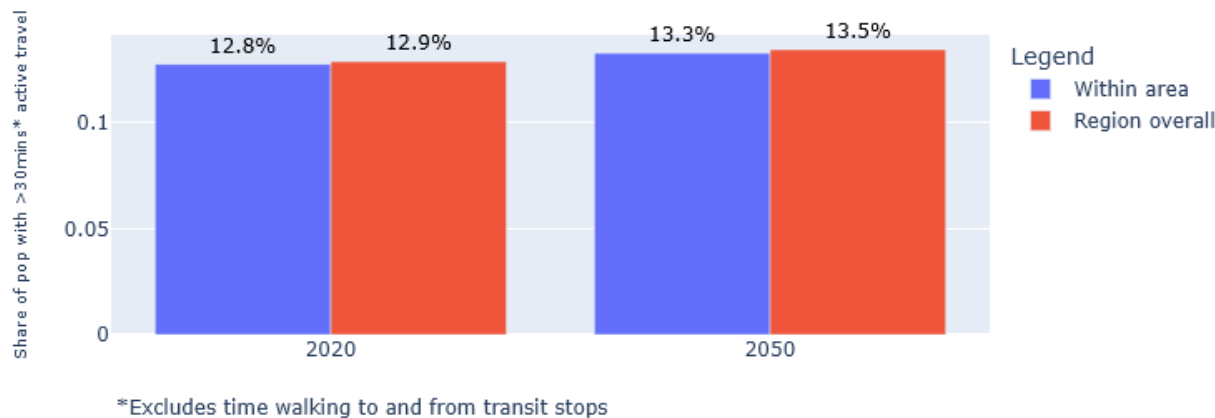
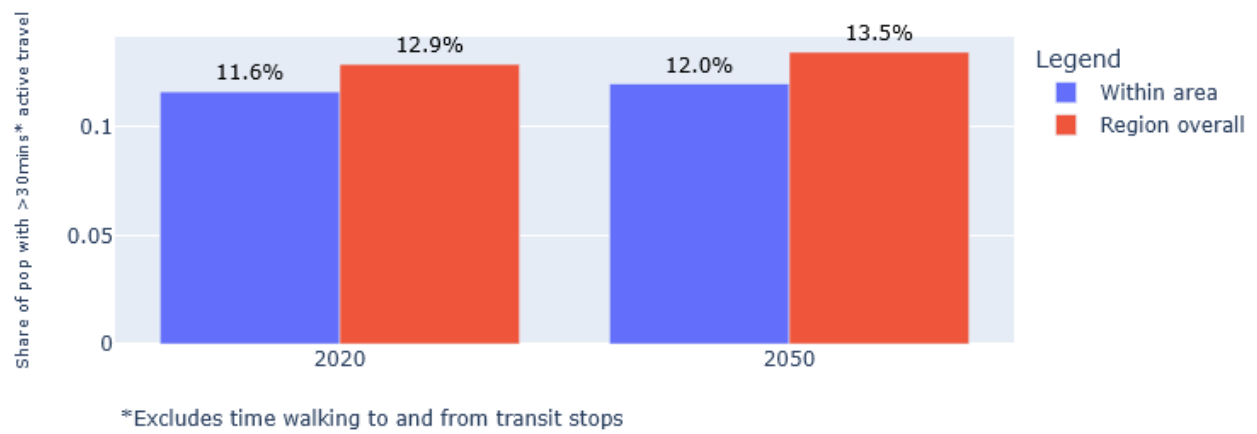


FIGURE 3-11 - ACTIVE TRAVEL IN AREAS WITH ABOVE AVERAGE MARRIAGE RATES

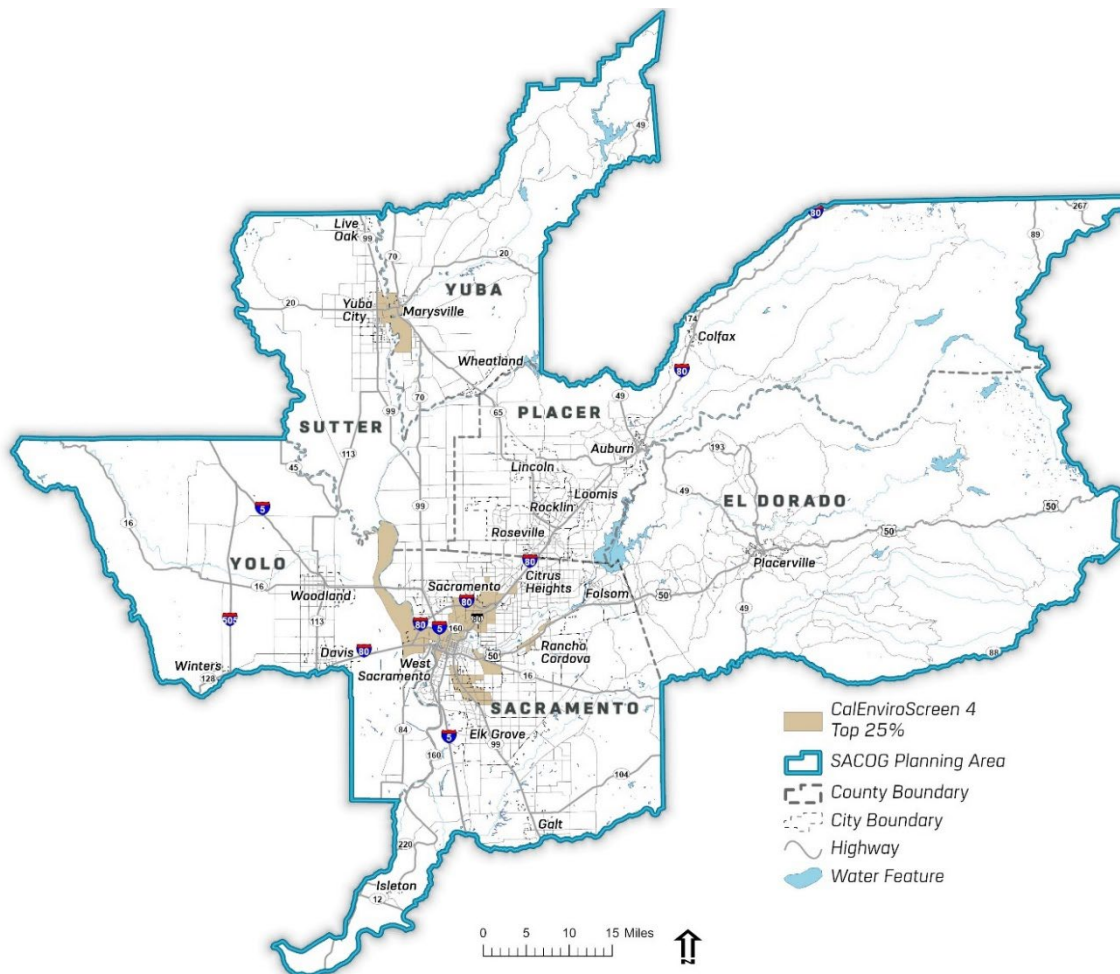


CalEnviroScreen 4.0 - Top 25th Percentile

CalEnviroScreen 4.0 (CES4) is a mapping tool that helps identify California communities that are most affected by many sources of pollution, and where people are often especially vulnerable to pollution's effects. CalEnviroScreen uses environmental, health, and socioeconomic indicators to produce a cumulative score for every census tract in the state. The scores are mapped so that different communities can be compared. The top 25% of census tracts identified by CalEnviroScreen 4.0 are significant because they are officially designated as "disadvantaged communities" by the California Environmental Protection Agency (CalEPA). An area with a high score is one that experiences a much higher pollution burden than areas with low scores. CalEnviroScreen uses pollution burden indicators and population characteristics based on data that are available from state and federal government sources. The data for this analysis is based on the top 25th percentile cumulative score. The SACOG region includes 206 census tracts that are identified as vulnerable under the CalEnviroScreen criteria.

Figure 3-12 shows the census tracts within the SACOG region that fit the CES4 top 25 percent criteria.

FIGURE 3-12 - CALENVIROSCREEN 4.0 TOP 25% AREAS



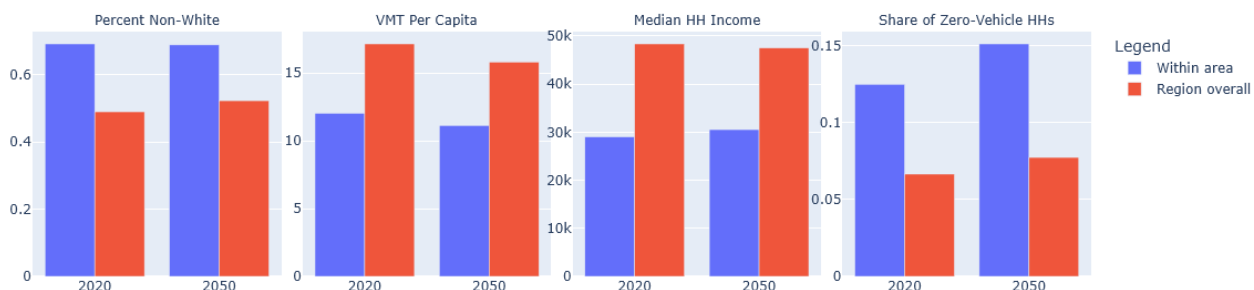
Demographics in Base and Horizon Years

In both the base year (2020) and horizon year (2050), the areas within the top 25th percentile of CalEnviroScreen have higher shares of non-white residents and lower income households, with only slight income increases within

the geography, as seen in Figure 3-13. Residents living in these areas will see a decrease in vehicle miles traveled, as well as an increase in the number of households without a car. As in other geographies, as transit access expands over plan implementation, fewer households will need vehicles to meet their transportation needs.

FIGURE 3-13 - DEMOGRAPHIC FACTORS IN CES4 TOP 25% AREAS

CES4 Top Quartile



2025 Blueprint Plan Performance in CES4 Top Quartile Areas

If the plan is implemented, residents within this geography will have more access to key resources overall.

- Residents living in the geography will be able to access an additional 134,000 jobs using a car in 2050 when compared to 2020 [22% increase] and an additional 54,000 jobs when using transit [400% increase], as seen in Figure 3-14.
- Residents living in the geography will be able to access more important resources, like higher education institutions and medical facilities, with 72% of residents living within 30 minutes of a school if they take transit and 65.5% of residents living within 30 minutes of a major medical facility if they take transit. These are significant increases when compared to the 2020 base year, which saw only 17% of residents within a 30-minute transit trip for schools and 26.9% within a 30-minute transit trip for major medical facilities.
- Health is also a major part of quality of life, and through the investments and projects in the plan, we see an increase of residents getting 30 minutes or more physical activity because of their travel, as seen in Figure 3-15. This number does not count the amount walking someone will do if they take transit, which would suggest that even more people are being active.

FIGURE 3-14 - ACCESSIBILITY METRICS IN CES4 TOP 25% AREAS

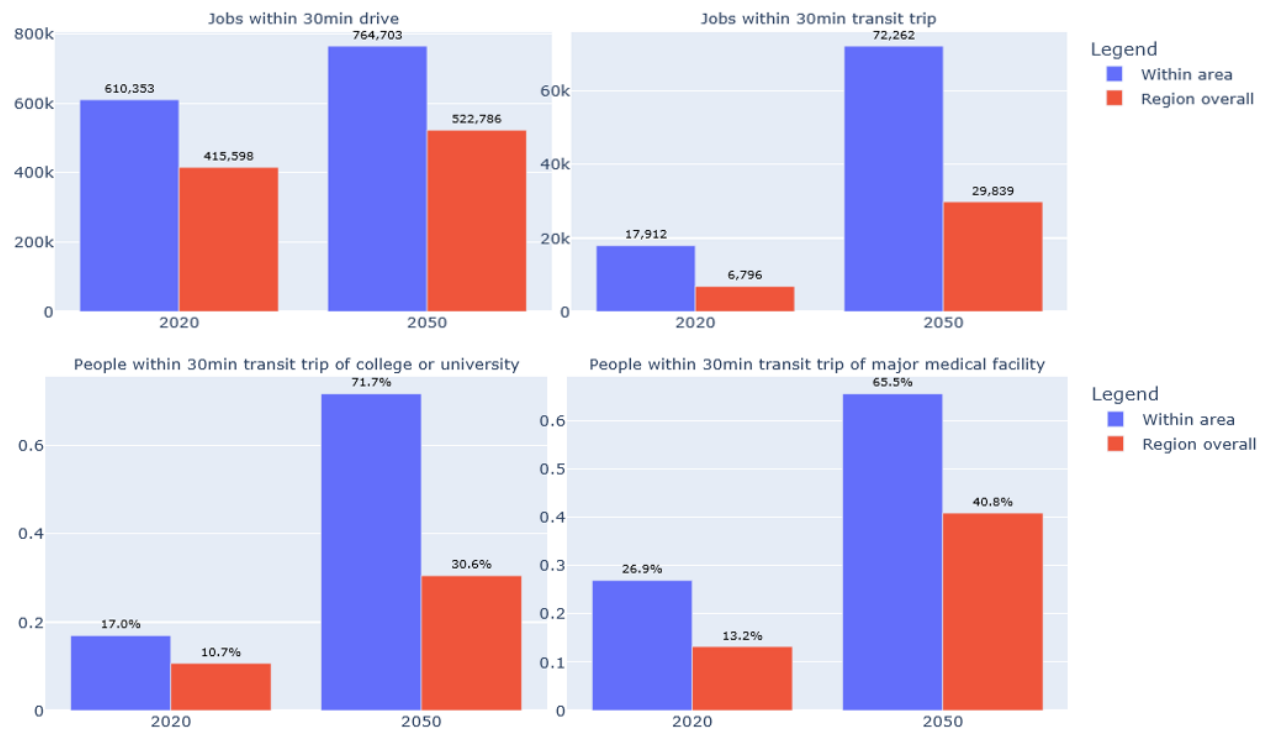
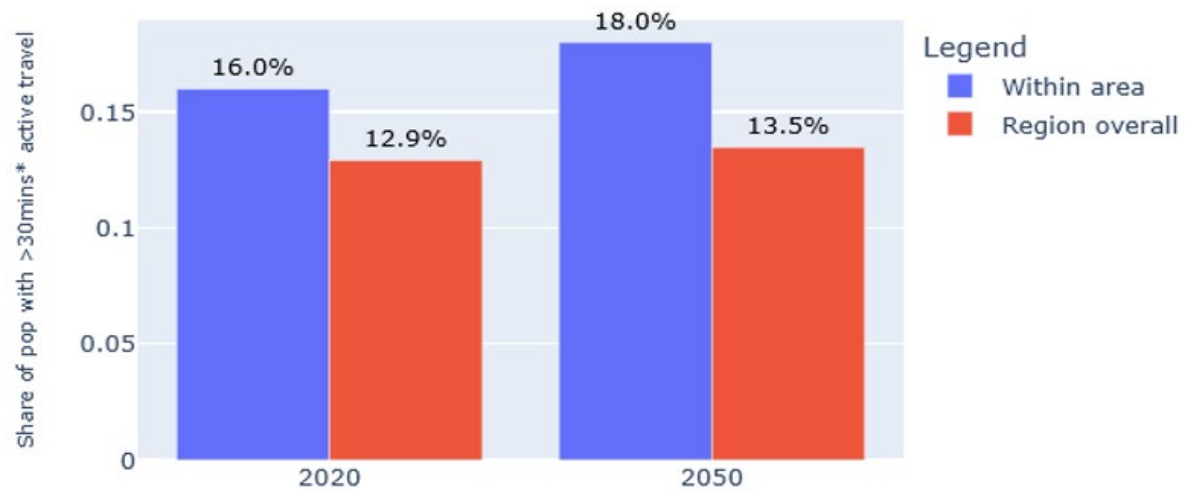


FIGURE 3-15 - ACTIVE TRAVEL IN CES4 TOP 25% AREAS

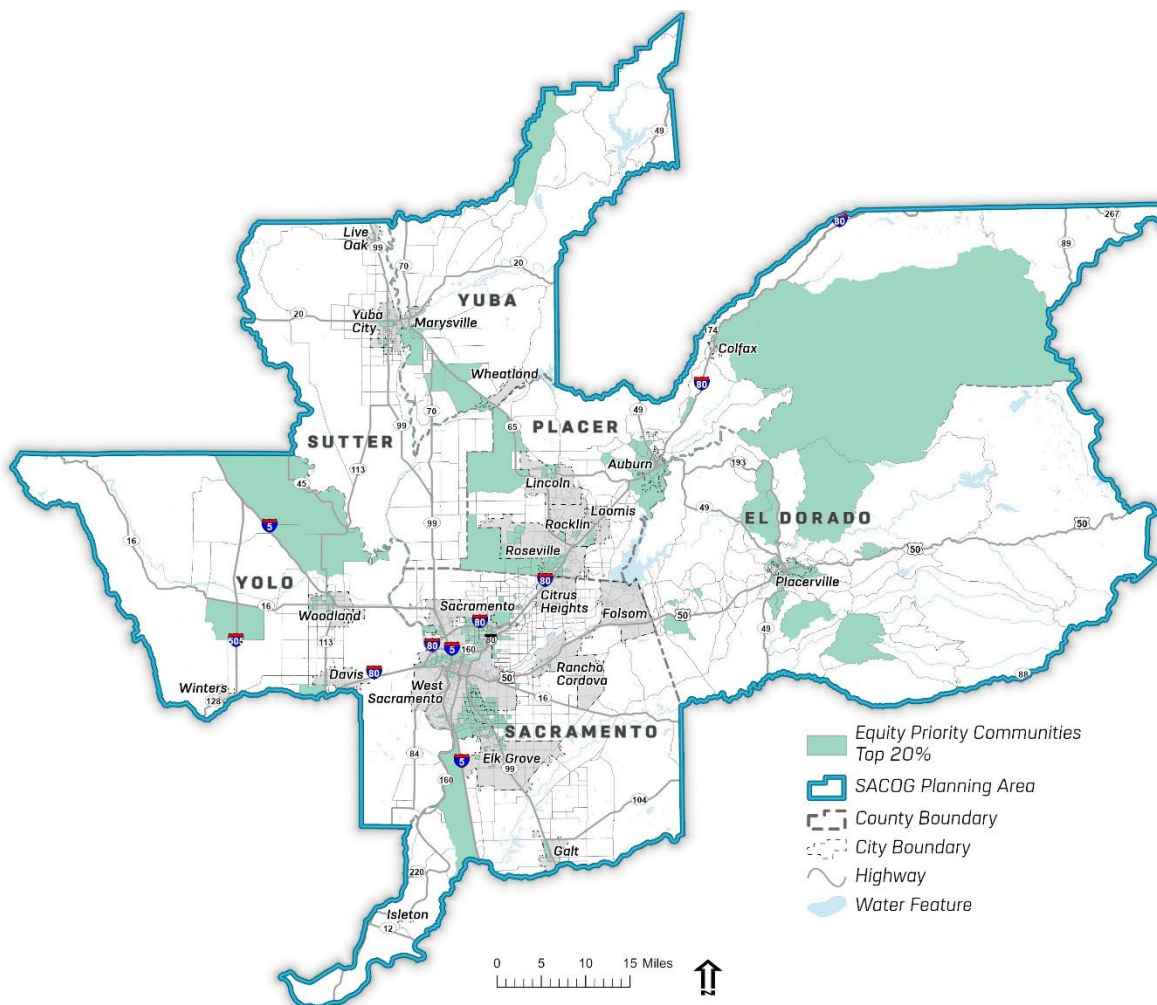


*Excludes time walking to and from transit stops

Mobility Zones Equity Priority Communities (EPCs)

The purpose of developing EPCs was to identify communities that have historically been marginalized and underserved by transportation projects. The EPC methodology predominantly focuses on demographic characteristics within communities, rather than broader mobility concerns, including barriers to access and quality of life issues. EPCs are Census block groups that have higher concentrations of demographic characteristics than other areas within the same county (see Figure 3-16 for map). As mentioned above, EPCs were developed in partnership with community members, with each criteria weighed differently by each county, depending on which were important and relevant to the local context. EPCs include criteria that are not featured in other geographies in this analysis, such as linguistic isolation, educational attainment, cost burden (housing and transportation), age, and ability. A complete list of equity criteria can be found in Table 1 on page 1 of the [methodology memo](https://www.sacog.org/home/showpublisheddocument/2754/638736636416570000) (available at <https://www.sacog.org/home/showpublisheddocument/2754/638736636416570000>).

FIGURE 3-16 - EQUITY PRIORITY COMMUNITIES TOP 20% AREAS



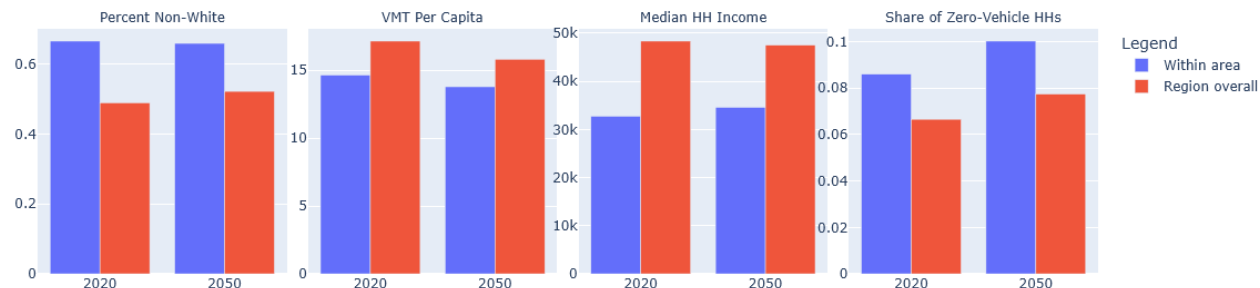
Demographics in Base and Horizon Years

In both the plan base year (2020) and plan horizon year (2050), EPCs have higher shares of non-white residents and lower-income households as compared with the region overall. These areas also have a higher share of

households who do not own a car. Fewer households with cars contribute to these areas having lower VMT per capita compared to the region, as seen in Figure 3-17.

FIGURE 3-17 - DEMOGRAPHIC FACTORS IN EQUITY PRIORITY COMMUNITIES TOP 20% AREAS

EPC 20th County PctI



2025 Blueprint Plan Performance in EPCs

If the plan is implemented, residents living in EPCs are expected to experience significant improvements across the board in accessibility to jobs, education, and hospitals. Performance highlights, as seen in Figures 3-18 and 3-19, include the following:

- The average resident will have access to ~29,000 more jobs by transit, or +460% more than they can currently access. Residents will also see an increase in access to jobs within 30-minute commute by car.
- The percentage of residents who can travel to a college or university on a 30-minute transit trip more than doubles by the horizon year.
- This geography sees an increase of over 200% in the number of community members with access to a major medical facility within a 30-minute transit ride.
- This geography sees a modest increase in the amount of people getting at least 30 minutes of physical activity through walking or biking to get around.

FIGURE 3-18 - ACCESSIBILITY METRICS IN EQUITY PRIORITY COMMUNITIES TOP 20% AREAS

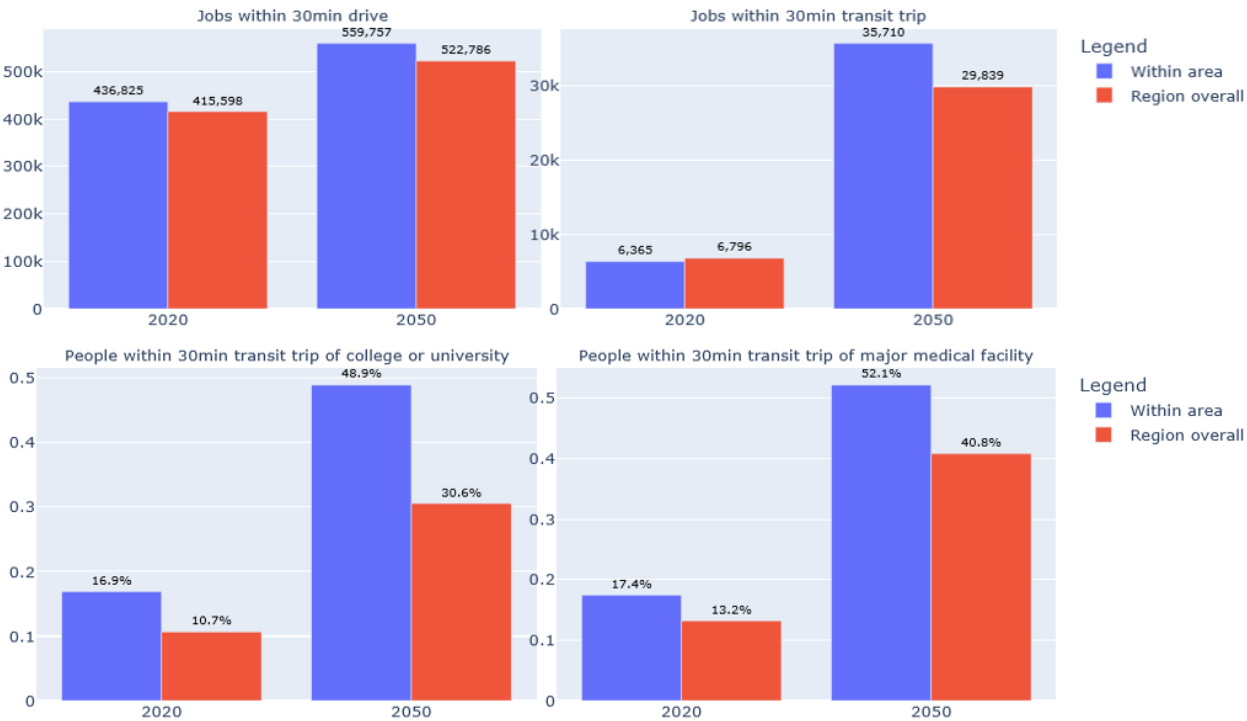
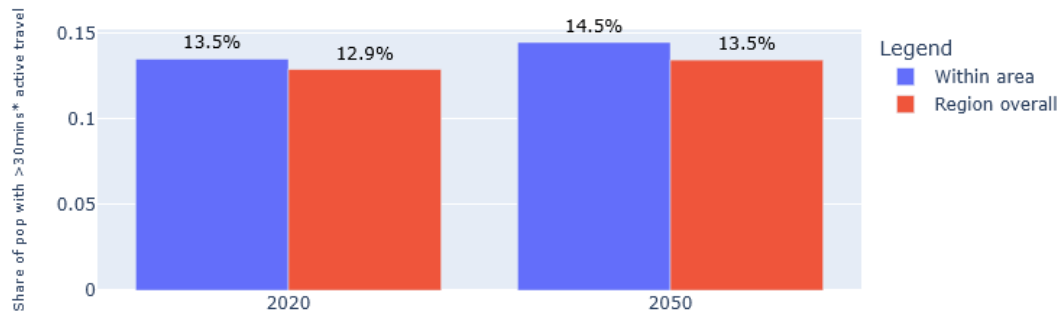


FIGURE 3-19 - ACTIVE TRAVEL IN EQUITY PRIORITY COMMUNITIES TOP 20% AREAS

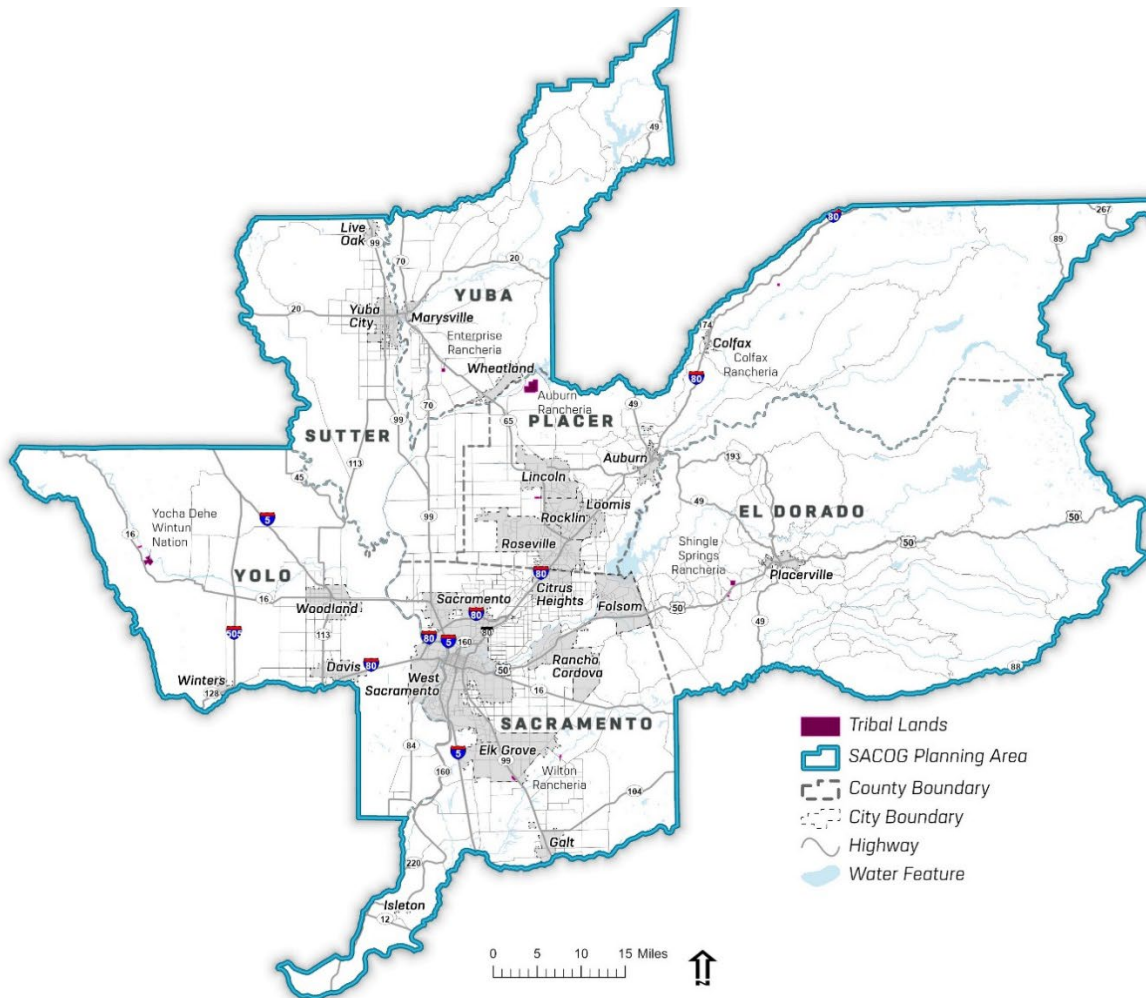


*Excludes time walking to and from transit stops

Tribal Lands

As noted above, this analysis uses data from the federal Bureau of Indian Affairs, and as such does not include any non-federally recognized Tribal lands. There are four federally recognized tribes that share geography with the SACOG region, as seen in Figure 3-20: Yocha Dehe Wintun Nation (formerly Rumsey Rancheria), Wilton Rancheria, Shingle Springs Band of Miwok Indians, and United Auburn Indian Community. In addition, the Estom Yumeka Maidu Tribe of the Enterprise Rancheria, formally located in Butte County, owns land and operates a hotel, casino, and entertainment venue in Yuba County.

FIGURE 3-20 - MAP OF TRIBAL LANDS



Demographics in Base and Horizon Years

In both the plan base year (2020) and plan horizon year (2050), Tribal lands have lower shares of non-white residents and lower-income households as compared with the region overall, as seen in Figure 3-21. It is important to note that based on SACOG's land use forecast, fewer than 50 households are projected to be located on Tribal lands for the plan horizon year. This is likely an incomplete representation of households on Tribal lands, as discussed in the data limitations of this analysis. Households residing on Tribal lands have much higher rates of

VTM per capita than the region overall, highlighting the limited range of transportation options available to those residents.

FIGURE 3-21 - DEMOGRAPHIC FACTORS IN TRIBAL LANDS



2025 Blueprint Plan Performance for Tribal Lands

Given the limited number of households located on Tribal lands and that Tribal lands in the SACOG region often include key regional job and entertainment centers, the analysis done for this geography looks at Tribal lands as a destination, not a point of origin. If the plan is implemented, Tribal lands in the SACOG region can expect to become significantly more accessible to workers and the general public by car and transit, as seen in Figures 3-22 and 3-23. However, by the plan horizon year, there is a very large proportional increase in access to Tribal lands by transit, as seen in Figure 3-23, representing nearly 6x more workers, and more than 4x more people. These accessibility numbers do not, however, include any transit services operated by the casinos and/or by the Tribes, of which there are several.

FIGURE 3-22 - DRIVING ACCESSIBILITY IN TRIBAL LANDS

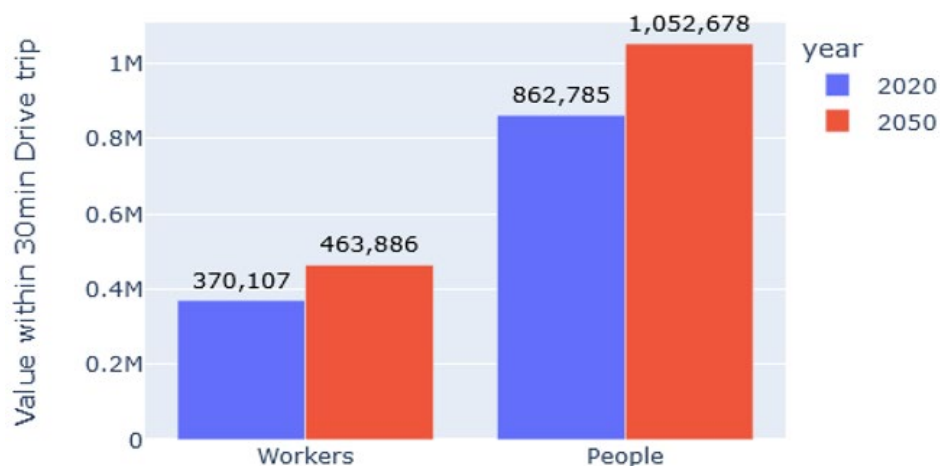
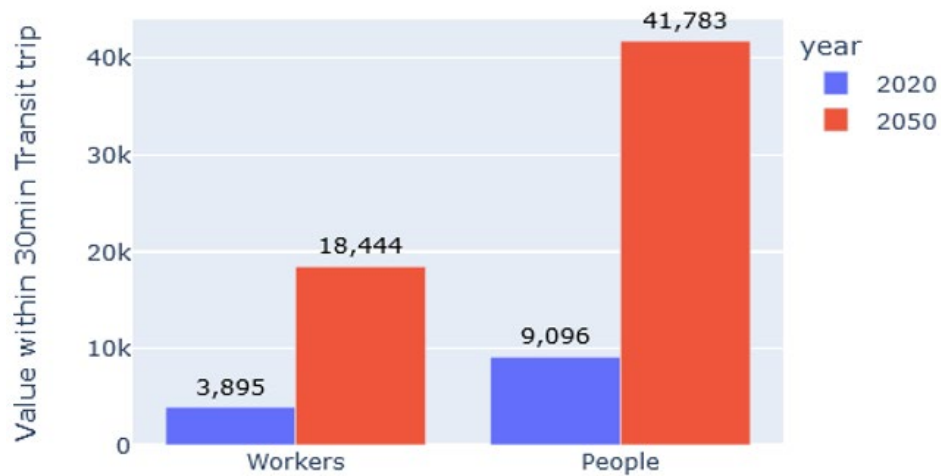


FIGURE 3-23 - TRANSIT ACCESSIBILITY IN TRIBAL LANDS



Conclusion

This analysis demonstrates that the 2025 Blueprint, when implemented, makes meaningful progress toward a more equitable, connected, and healthy Sacramento region. Across all the analyzed geographies, areas of persistent poverty, high birth and marriage rate areas, CalEnviroScreen top quartile tracts, Equity Priority Communities, and Tribal lands, the plan delivers measurable improvements in access, mobility, and quality of life.

Demographic trends show modest income shifts and continued growth in communities of color, aligning with a forecasted minority-majority region. Transit access to jobs increases dramatically, with some areas seeing over 400% more jobs reachable within 30 minutes. Access to higher education and major medical facilities via transit more than doubles in many geographies. Tribal lands become significantly more accessible by transit, with a nearly sixfold increase in worker access. Vehicle miles traveled per capita decline across the board, reflecting increased mobility choices and the potential for reduced reliance on car ownership. Active transportation also rises, supporting healthier lifestyles.

The Blueprint's triple bottom line approach of economy, environment, and equity ensures that historically underserved communities benefit from infrastructure investments. The plan supports a future where people live closer to jobs, have more transportation choices, and enjoy cleaner air and safer streets. These tangible benefits are delivered across diverse communities, helping to build a region that is more inclusive, resilient, and livable for all.

Section 4: Autonomous Vehicles (AV), Shared Mobility & Connected Vehicles (CV) Scenario Analysis

Introduction

Autonomous Vehicles, Shared Mobility & Connected Vehicles are emerging and are major disruptors to travel behavior. Depending on implementation and deployment levels and speed, the impact and performance of the 2025 Blueprint transportation infrastructure will vary on severity and directionality. Given the uncertainty of these developments, SACOG developed a scenario-based analysis approach to better understand the performance impacts and implications of these key transportation disruptors. This scenario approach can be used in comparison with other sections in the Plan Performance appendix to provide a wider view of ranges and directionality of impacts to the 2025 Blueprint.

SACOG's regional travel forecasting model, SACSIM, can test different scenarios on the market penetration of Autonomous Vehicles (AVs) [i.e. the percentage of households owning an AV] and the degree to which AVs are shared [i.e. "hired" by users like a present-day Transportation Network Companies (TNC)] as opposed to being owned as private personal/household vehicles. The scenario testing functionality was built based on the following behavioral assumptions regarding AVs and vehicle sharing:

- AVs are likely to reduce the perceived cost of time spent in a vehicle, because travelers in AVs can engage in other activities.

- Owned AVs within a household can be "re-purposed" to serve more residents within the same household [i.e. an owned AV can be used by one worker to get to work, travel with no occupant back to the household and serve another household member's trip].

- AVs in general are likely to reduce the number of vehicles privately owned.

- If AVs are owned and used privately, the fact that a single vehicle can be re-purposed to serve several household members reduces the need for each household member to have his/her own personal vehicle.
 - If AVs are not widely owned privately, but are widely available for shared use, households can avoid purchasing a vehicle altogether, or can use a shared AV like a TNC to fill in if a household vehicle is being used by another household member.

- If AVs are widely deployed and widely shared, they will compete with transit, especially for shorter trips.

Scenario Testing Factors

AV adoption rate—this is the percentage of privately-owned vehicles that are AVs. Owning AVs within a household has several effects in the modeling. Household AVs are more heavily used [e.g. the same vehicle may drop off one household member at work, and return home to serve another household member going to a different activity, like school]. The greater utility of the AV makes owning fewer vehicles possible for some households—but it also results in "zero occupant" vehicle trips.

Connected vehicle effects on highway capacity--as AVs become more prevalent, highways could potentially operate more efficiently and at higher capacity, by "platooning" of AVs through connected vehicle technology. In the modeling, this factor results in reduced congestion and faster travel speeds.

TNC (shared vehicle) utilization rate--expressed as the percentage of vehicle trips made using TNCs rather than driving a privately-owned vehicle. In the modeling, this factor results in lower vehicle ownership, and greater reliance on TNCs for shorter trips that may otherwise be served by transit, biking or walking.

There are many other primary and secondary factors and uncertainties not included in these five tests: effects of AVs and TNCs on the market for paid parking; variations in the impact of AVs on the “cost” of time spent in a vehicle; uncertainties on the future costs of AV and TNC use relative to other modes; and other factors.

Analysis Findings and Performance Impact

Table 4-1 compares the outcomes of the five scenarios described below:

Scenario 1 is essentially a “baseline” for these tests, with the future looking essentially like today: no AVs, no CV effects on highway capacity, and very low TNC usage.

Scenario 2 assumes a very slow rate of adoption of AVs, with only about 4 percent of privately owned vehicles being AVs. At this low level, the potential effects of CVs on highway capacity would not occur. TNC use in this scenario is high at 9 percent of all personal vehicle trips— though no firm estimates of TNC mode share for all trips exists for other regions, some evidence suggests this is approximately the level of TNC use in San Francisco today. Because the shifts in this scenario are relatively modest, the changes relative to Scenario #1 are also relatively small, and the overall impact of VMT is negligible. The biggest impact is on vehicle ownership, which drops by about 12 percent compared to Scenario 1.

Scenario 3 assumes a faster rate of AV adoption (21 percent) and greater willingness to use TNCs (17 percent). For this scenario, no CV highway capacity effects were assumed. The higher reliance on TNCs shifted more trips from bike, walk, and transit. For both AVs and TNCs, the higher rate of zero-occupant trips generated by re-positioning both household AVs and TNC providers resulted in a small increase in VMT compared to scenario 1.

Scenario 4 assumes that AVs are owned by nearly all households (89%), but used largely privately, so TNC usage is relatively low (13 percent). In this scenario, AVs are essentially used as chauffeurs by most households, shuttling various household members to different activities, and often dead-heading to serve another household member. At this high level of AV adoption, some of the effects of CVs on highway capacity were assumed, with a 10 to 20 percent increase in capacity relative to Scenario 1. Mode shifts from bike, walk and transit to vehicle modes is greater for this scenario, and household-generated VMT increases by 16 percent compared to Scenario 1. Congestion on the roadways decreases sharply, due to the CV effects.

Scenario 5 assumes both high AV adoption, high TNC usage, and the largest CV effects on highway capacity. The impact on vehicle ownership is the greatest (-40%), and the increased usage of TNCs offsets somewhat the number of zero-occupant vehicle trips—so the increase in VMT (+9%) is lower than Scenario 4.

TABLE 4-1 - COMPARISON OF AV/TNC TESTING SCENARIOS

	#1	#2	#3	#4	#5
	Future Looks kind of Like Today	Slow AV Adoption, TNC Share Growing Fast	AV Adoption & TNC Share Growing Slightly Faster	Full AV Adoption, Some CV Effects; TNC Share Growing Fast	Full AV & CV Adoption; TNCs Are Dominant Vehicle Mode
Autonomous Vehicle, Connected Vehicle, TNC Factors					
AV Market Penetration	0%	4%	21%	89%	88%
Connected Vehicle Effects - Roadway Capacity ¹	n/a	n/a	n/a	10% to 20% Increased	20% to 50% Increased
% of Vehicle Trips by TNC Mode	<1%	9%	17%	13%	53%
Outcome Metrics					
	Change from Scenario #1				
Household-Generate VMT (millions)	48.7	+0%	+3%	+16%	+9%
HHG VMT per Capita	17.09	+0%	+3%	+16%	+9%
Bike/Walk Mode Share	11.6%	-7%	-17%	-24%	-59%
Transit Mode Share	1.8%	+2%	-12%	-34%	-66%
Private Auto Mode Share	86.0%	-10%	-17%	-11%	-52%
Vehicles Per Household	1.81	-12%	-20%	-32%	-40%
Roadway VMT (millions)	71.7	+0%	+2%	+13%	+7%
Congested VMT % of Total Roadway VMT	6.4%	+0%	+6%	-30%	-60%

Source: SACOG

1. For scenario #4 and #5, assumed freeway capacity will be increased more 20% or 50%, while 10% or 20% for all other roadways.

Conclusion

Testing of three factors (AV market penetration, shared vehicle use, and changes to highway capacity) showed a wide range of potential impact to the Plan—most of which showed increases in VMT and likely increases in GHG. Only Scenario 2 showed no significant increase in VMT.

Testing also showed that while the biggest shifts in numbers of trips to TNC modes came from private auto modes, the impacts of the shifts on transit, biking and walking were significant, ranging from a negligible change (Scenario 2) to over 50 percent reduction (Scenario 5).

SACOG MASTER ON-CALL SERVICES: CATEGORY 8 -TASK ORDER 1 2025 BLUEPRINT HEALTH INDICATORS



Part 2: Health Indicators Analysis for the 2025 Blueprint

Prepared by Urban Design 4 Health

May 31, 2025

About this Project

In 2024, Urban Design 4 Health ([UD4H](#)) used a localized version of its National Public Health Assessment Model ([N-PHAM](#)) to estimate future lifestyle outcomes (physical activity and health) for three 2050 long range “Blueprints” for the Sacramento Area Council of Governments region. UD4H:

- Reviewed and evaluated SACOG’s baseline and future land use and transportation alternatives representing the three distinct future pathways,
- Estimated the built, natural, and social metrics to run N-PHAM statistical models that forecast lifestyle and community health outcomes, and
- Estimated the community health outcomes for the three future “Blueprint” pathways.

In 2025, UD4H used the same N-PHAM process to evaluate the “[2025 Blueprint](#)” developed by SACOG after reviews of the original three Blueprint Scenarios.

About this Report

Urban Design 4 Health prepared this technical memo (Part 2 in a two-part series) to present the estimated community health and physical activity impacts of the 2025 Blueprint. This report also describes the evidence base regarding the connections between land use and transportation and public health related outcomes, the N-PHAM methodology and the methods used to estimate community health outcomes.

A suggested citation is:

- Bachman, W., Fox, E., Chapman, J., Frank, L. (2025). 2025 Blueprint -- Sacramento Area Council of Government Public Health Assessment Model: Health Indicators Analysis. Prepared by [Urban Design 4 Health](#) for the Sacramento Area Council of Government under Contract# 220114, Task Order #1.

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About Urban Design 4 Health

UD4H’s mission is to support clients with innovative and objective information and tools to achieve health, environmental, economic, and quality of life goals that are intrinsic in efforts to build new communities and to retrofit existing ones. Learn more at www.ud4h.com



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EXECUTIVE SUMMARY

The [Sacramento Council of Government \(SACOG\)](#) is developing a [2025 Blueprint](#) to prepare for 2050 by building “a connected region that includes transportation options for residents, affordable housing for the region’s growing population, and equitable investments that give all community members access to a safe and healthy region.”

The region’s long-range land use and transportation plan will strengthen the region’s “[triple bottom line](#)”: [Equity, Economy, and Environment](#). Improving livability, health, and workforce productivity for the region’s residents is central to achieving this goal. This report is the second of two parts that evaluates how the different planned futures affect population-level chronic disease rates and treatment costs. Future estimates were generated using a localized version of [Urban Design 4 Health’s](#) National Public Health Assessment Model ([N-PHAM](#)), developed with partial financial support from the US Environmental Protection Agency.

How land use and transportation alternatives affect community health

Genetics, age, diet, and physical activity are the primary factors that affect a person’s risk for debilitating chronic diseases such as diabetes (type 2), high blood pressure, coronary heart disease, and others. On a population level, diet and physical activity factors are influenced by land use and transportation policies that affect a person’s ability to be physically active and to have safe, convenient, nearby access to desired destinations (e.g., jobs, school, health care, transit, and healthy food). A growing body of evidence suggests that health-focused community investments can have sustained, broad-reaching population-level health benefits for people who live, work, attend school and play in those communities.^{i,ii,iii,iv,v,vi} Regions that invest in active transportation, land use diversity, and social connection are more likely to have lower rates of chronic disease and higher workforce productivity.

2025 Blueprint assessment results

By 2050, the region is expected to have higher percentages of older adults than in 2025 and, therefore, higher prevalence rates of chronic disease. The 2025 Blueprint plan mitigates this forecast by providing a range of land use and transportation changes that encourage active lifestyles, active transportation, and social connection. The total expected annual economic impact of these changes on reduced levels of chronic disease (represented by coronary heart disease, hypertension, and type 2 diabetes) is **over \$5 billion** over the course of time from 2025 to 2050. The 2025 Blueprint’s land use and transportation investments reduce the annual health care cost burden by **over \$200 million annually**. The land use forecast provides balanced residential housing growth through a mix of community types offering varying health-promoting lifestyles and active transportation alternatives.

The 2025 Blueprint evaluation also evaluated the potential health impact of different development types where new housing units are planned. Results show that health outcomes for residents of planned new housing units in the “Centers and Corridors” community type will experience lower chronic disease prevalence rates compared to other areas. The N-PHAM modeling analysis also provided neighborhood level estimates of health outcomes that can be used by the region to evaluate future land use and transportation alternatives.

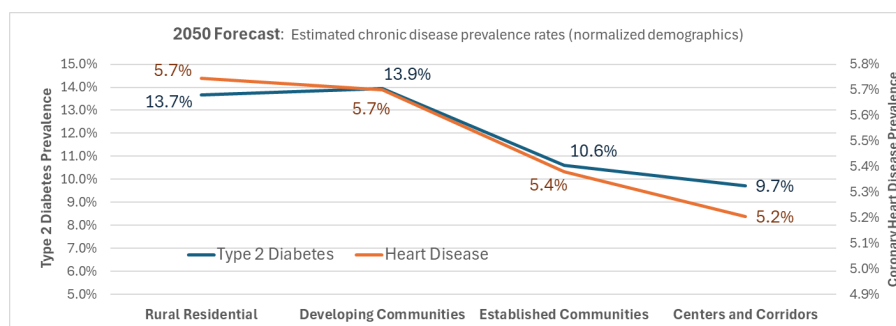


Figure 1: Estimated 2050 prevalence of type 2 diabetes and heart disease by development type

These benefits are the direct result of the Blueprint’s strategy to prioritize growth within existing cities, suburbs, and small towns. Almost 70% of all forecasted housing growth and 80% of all job growth occurs in centers and corridors or established communities, which make up the region’s infill areas.

INTRODUCTION

The Sacramento Area Council of Governments (SACOG) developed a land use forecast and transportation project list for the 2020-2050 period as part of its [2025 Blueprint](#). Understanding the estimated health-related impacts of different planning strategies will aid the region in achieving long-term improvements in community quality of life and the “triple bottom line” (equity, environment, and economy).

This report discusses how the 2025 Blueprint might affect population-level prevalence rates for coronary heart disease (CHD), type 2 diabetes, high blood pressure (HBP) obesity (body mass index greater than 30) and their health-related economic impact. Appendix A describes and documents the data, software, and technical development of a localized and customized version of Urban Design 4 Health’s National Public Health Assessment Model ([N-PHAM](#)), called Sacramento PHAM (SAC-PHAM)

The associations between land use, transportation, and community health are complex. Individual lifestyles and daily activities are influenced by local environments that provide opportunity and accessibility. A growing body of evidence suggests that health-focused community investments can have sustained broad-reaching population level health benefits for people who live, work, go to school, and play in those communities. **Figure 2** describes the pathways from environment/travel options that affect behaviors, exposures, biological responses, and chronic health conditions. On average, more isolated and car-dependent communities typically have higher percentages of adults with chronic disease and higher average body mass indices (BMIs).

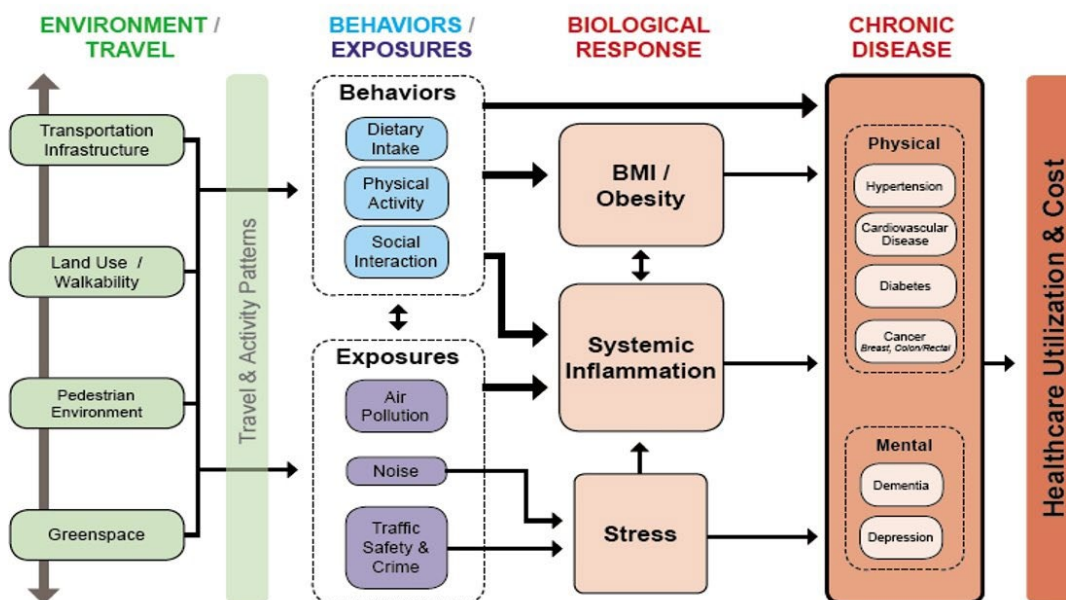


Figure 2: Linkages between the built environment and community health¹

The challenge for the region and those deciding long-term investment strategies is how to create a future that is equitable, environmentally sustainable, and economically strong (the triple bottom line) and one that also considers impacts on population health and lifestyle, elements that are inherent to each of the three goals.

¹ Frank, L. D., Iroz-Elardo, N., MacLeod, K. E., & Hong, A. (2019). Pathways from built environment to health: A conceptual framework linking behavior and exposure-based impacts. *Journal of Transport & Health*, 12, 319-335. <https://doi.org/10.1016/j.jth.2018.11.008>

COMMUNITY HEALTH MODELING METHODOLOGY

The National Public Health Assessment Model ([N-PHAM](#)) was developed by Urban Design 4 Health over the last several years with partial support from the US Environmental Protection Agency. Additional funding from the Robert Wood Johnson Foundation supported the development of the data layers needed to calculate the built, natural, and social environment factors used by N-PHAM.

The tool is peer-reviewed^{vii, viii, ix} and methodologically grounded in an ecological framework that links environments with health impacts.^x It is applicable nationwide and operates on an extensive set of block-group level model inputs and outcomes. A customized version of N-PHAM was developed for SACOG and used to estimate the health impacts of the multiple pathways. The localized model predicts chronic disease prevalence rates for geographically represented neighborhoods using US Census geometry. The model relies on demographic data and built/natural environment metrics estimated by SACOG and supported by other sources such as the USEPA's Smart Location Database ([SLD](#)) and UD4H's National Environmental Database ([NED](#))². The core statistical models that forecast community health outcomes were generated from analysis of health data from the California Health Interview Survey ([CHIS](#)) and the National Household Travel Survey ([NHTS](#)) datasets that linked survey participants with built and natural environment data.

The generalized process is described in Figure 3. Geospatial data developed are loaded into the N-PHAM modeling process, supplemented with local health survey data, and processed through statistical models to estimate health outcomes by neighborhood.

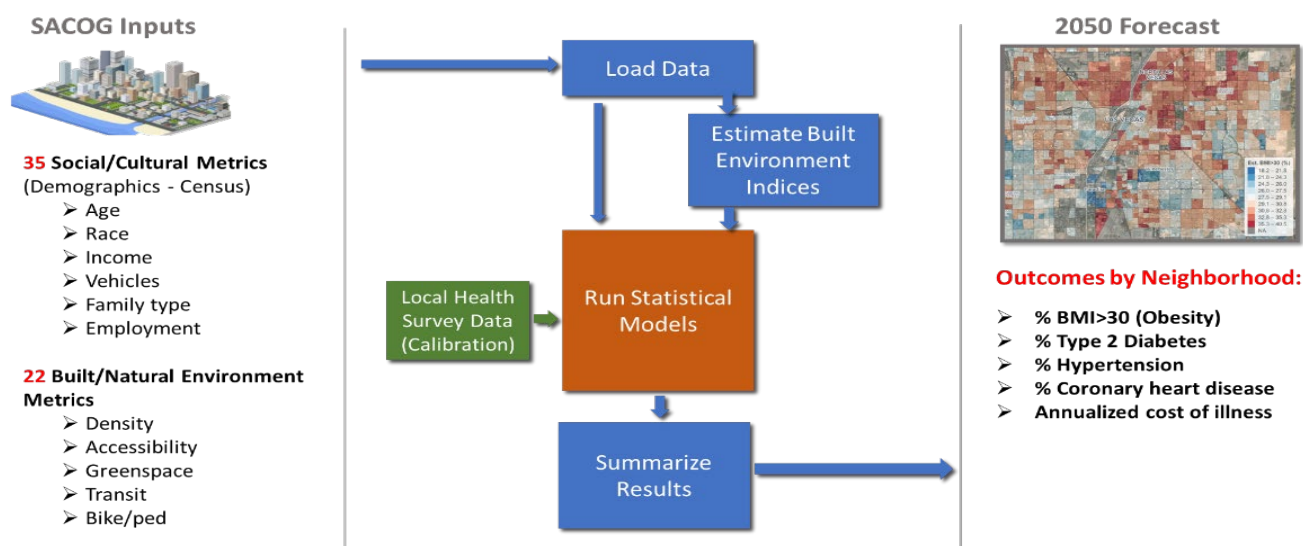


Figure 3: N-PHAM data processing for SACOG

N-PHAM also estimates an annualized per-capita cost for chronic disease (represented by coronary heart disease, type 2 diabetes, and hypertension). Appendix B provides more details on the sources used that translate disease prevalence into health-related economic costs. N-PHAM estimates these costs for neighborhoods and then aggregates them for the region.

² The National Environmental Database (NED) was developed by Urban Design 4 Health with support from the Robert Wood Johnson Foundation. For more information see <http://urbandesign4health.com/projects/ned>

2025 BLUEPRINT - NPHAM INPUT DATA

SACOG defined a 2025 Blueprint described with a future estimate of parcel-level land use, transportation networks, and demographics (distributions of age, race/ethnicity, income, etc.). As part of this planning process, SACOG assigned parcels in the region to different community types (Table 1).

Table 1: Summary Descriptions of Community Types.

Community Type	Description
Centers and Corridors	Higher density and more mixed land use than surrounding areas. Identified in local plans as historic downtowns, main streets, suburban or urban commercial corridors, rail station areas, central business districts, or town centers.
Established Community	Typically, adjacent to or surrounding Center/Corridor Communities are characterized as “first tier” “inner ring” or mature suburban communities. Established Communities often comprise existing low- to medium-density residential neighborhoods, office and industrial parks, or commercial strip centers.
Developing Community	Mainly situated on vacant land at the edge of existing urban or suburban development and characterized as the next increment of urban expansion in the region. Plans may designate them as residential-only, employment-only, or a mix of residential and employment uses.

Source: [2050 Blueprint Pathway Land Use Evaluation](#), SACOG, 2023.

By 2050, the region is expected to have approximately 275,000 new housing units. Each Blueprint Pathway and the final 2025 Blueprint allocated the placement of new housing units differently across development types (**Figure 4**). Pathway 1 encouraged more residential development in “Developing” areas. These are typically further from existing employment centers. Pathway 3 encouraged more residential development within “Centers and Corridors” or “Established Communities”. Pathway 2 was a balance between those two pathways. The 2025 Blueprint, shown in green, is the draft result of SACOG planning processes to find a balanced pathway for the many competing priorities in the region.

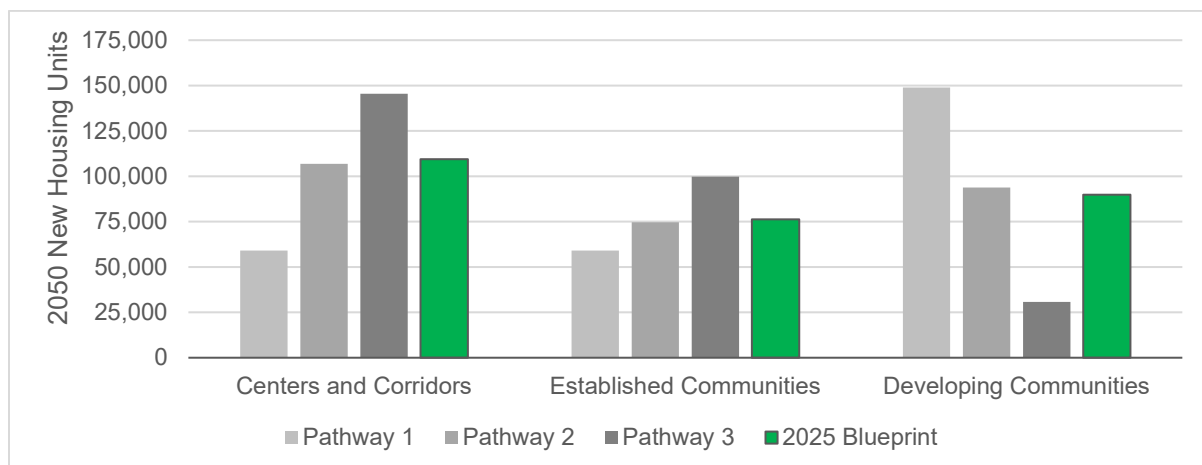


Figure 4: Future new housing units by development type

In addition to the new developments, changes in land use types and transportation systems (vehicle, transit, and bike/ped) are also forecasted. These changes are not described further in this report but are available from SACOG. Demographics are also forecasted to change in the region by 2050. Most critically, the region

is expected to have a larger percentage of adults over the age of 65, which affects forecasted prevalence rates of chronic disease.

Figure 5 shows examples of the built environment indices for the core Sacramento area and used by N-PHAM and other demographic and transportation network data. Purple areas show higher accessibility and orange areas show lower accessibility. Accessibility was defined using a 1km walkable network distance. The bicycle and pedestrian network accessibility index (not shown) was developed from the bike/ped infrastructure, safety, and crime data.

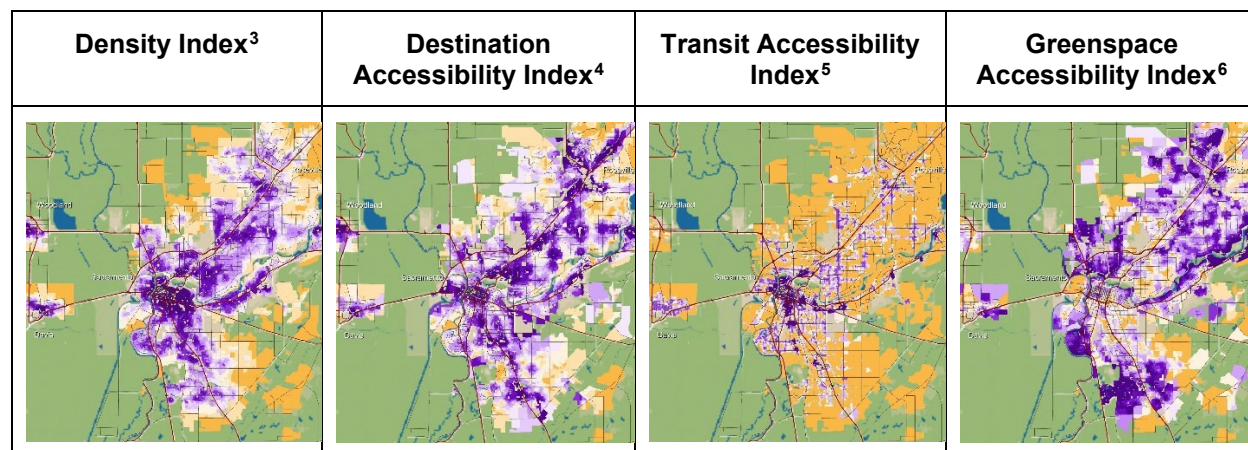


Figure 5: 2050 Built environment metrics for the core Sacramento area

Detailed demographic data at the 2020 US Census Block Group (CBG) was developed by SACOG for 2050 and provided to UD4H for inclusion in the N-PHAM assessment.

2025 BLUEPRINT - ESTIMATED HEALTH OUTCOMES

The causes and risks of having a chronic disease are many, interrelated, and complex. The risk of having one of the health-related conditions presented below can be reduced through lifestyle choices (e.g., being physically active, having healthy food availability, and not being overweight or obese). The ease of making the healthier choice is impacted by how communities are designed (e.g., transportation options, proximity, and connectivity of different land uses, including access to greenspace).

This 2050 community health assessment answers the following questions:

1. What are the estimated 2050 prevalence rates and costs of chronic disease by neighborhood, development type, and for the SACOG region?
2. Do the proposed land use and transportation planning decisions improve or worsen community health and by how much?

One of the community health challenges for the SACOG region is an aging population. Chronic disease prevalence rates, particularly for heart disease and hypertension, rise steadily with age. In 2020, 23% of the SACOG region's population was over the age of 55. By 2050, this percentage is forecasted to increase

³ The density index was developed from the number of residents, the number of employees, and the density of the transportation network.

⁴ The destination accessibility index was developed from land use mix and jobs.

⁵ The transit accessibility index was developed from transit stops and route frequency

⁶ The greenspace accessibility index was developed from public parks and natural lands.

to 34%. Other demographic changes (race/ethnicity, family income, etc.) also play a significant role and are expected to vary over the next twenty-five years.

Estimated 2050 Health Outcomes

The estimated 2050 health outcomes for the 2025 Blueprint are shown in **Table 2**. These estimates include all forecasted land use, transportation and block group demographic changes and forecasted. Estimates are included for the full region and for each development type.

Table 2: Estimated 2050 Health Outcomes – All Housing, Full Region

	2050 All Housing Units	Obesity Prevalence	Coronary Heart Disease Prevalence	Hypertension Prevalence	Type 2 Diabetes Prevalence	Annual per Capita Cost of Illness
Full Region	1,231,475	29.1%	5.9%	29.2%	11.5%	\$2,241
Centers and Corridors	240,855	25.1%	4.3%	27.5%	10.5%	\$1,847
Established Communities	794,042	28.4%	6.1%	29.4%	11.3%	\$2,266
Developing Communities	110,575	35.3%	5.7%	28.2%	12.8%	\$2,255
Rural Residential	61,588	38.1%	8.6%	33.2%	14.9%	\$3,073
Agricultural and Natural Lands	23,325	38.8%	8.5%	33.6%	15.5%	\$3,153

Table 3 shows the same information, but only for locations by community type where the new 275,000 housing units are planned to be added by 2050. This shows that areas that have higher accessibility, connectivity land use mix are expected to have lower chronic disease prevalence rates.

Table 3: Estimated 2050 Health Outcomes - New Housing Only

	2050 New Housing Units Only	Obesity Prevalence	Coronary Heart Disease Prevalence	Hypertension Prevalence	Type 2 Diabetes Prevalence	Annual per Capita Cost of Illness
Full Region	275,825	29.7%	5.1%	28.1%	11.5%	\$2,049
Centers and Corridors	107,678	24.6%	4.0%	27.3%	10.1%	\$1,735
Established Communities	79,044	29.3%	5.8%	28.4%	11.0%	\$2,136
Developing Communities	86,239	36.0%	5.8%	28.8%	13.5%	\$2,330
Rural Residential	2,839	37.6%	8.4%	32.7%	15.2%	\$2,969
Agricultural and Natural Lands	25	43.0%	7.4%	32.7%	17.8%	\$3,055

Table 4 shows how the 2025 Blueprint's land use and transportation planning solutions impact chronic disease economic impacts by eliminating the effect of changing demographics. In this evaluation, 2020 demographics were left unchanged for 2050.

Table 4: Estimated 2050 Health Outcomes - Demographics Held Constant

	2050 Housing Units	2020 Annual per capita COI	2050 Annual per capita COI	Annual per capita Savings	Annual Total Savings due to LU and Transportation
Centers and Corridors	240,855	\$1,964	\$1,663	\$301	\$71,364,021
Established Communities	794,042	\$1,938	\$1,753	\$185	\$147,046,271
Developing Communities	110,575	\$2,049	\$2,003	\$46	\$5,110,319
Rural Residential	61,588	\$2,106	\$1,994	\$112	\$6,892,491
Agricultural and Natural Lands	23325	\$2,383	\$2,008	\$374	\$8,731,045
<i>Total:</i>					\$239,144,147

2050 Body Mass Index Greater than 30

Estimated percentage of the population with BMI>30

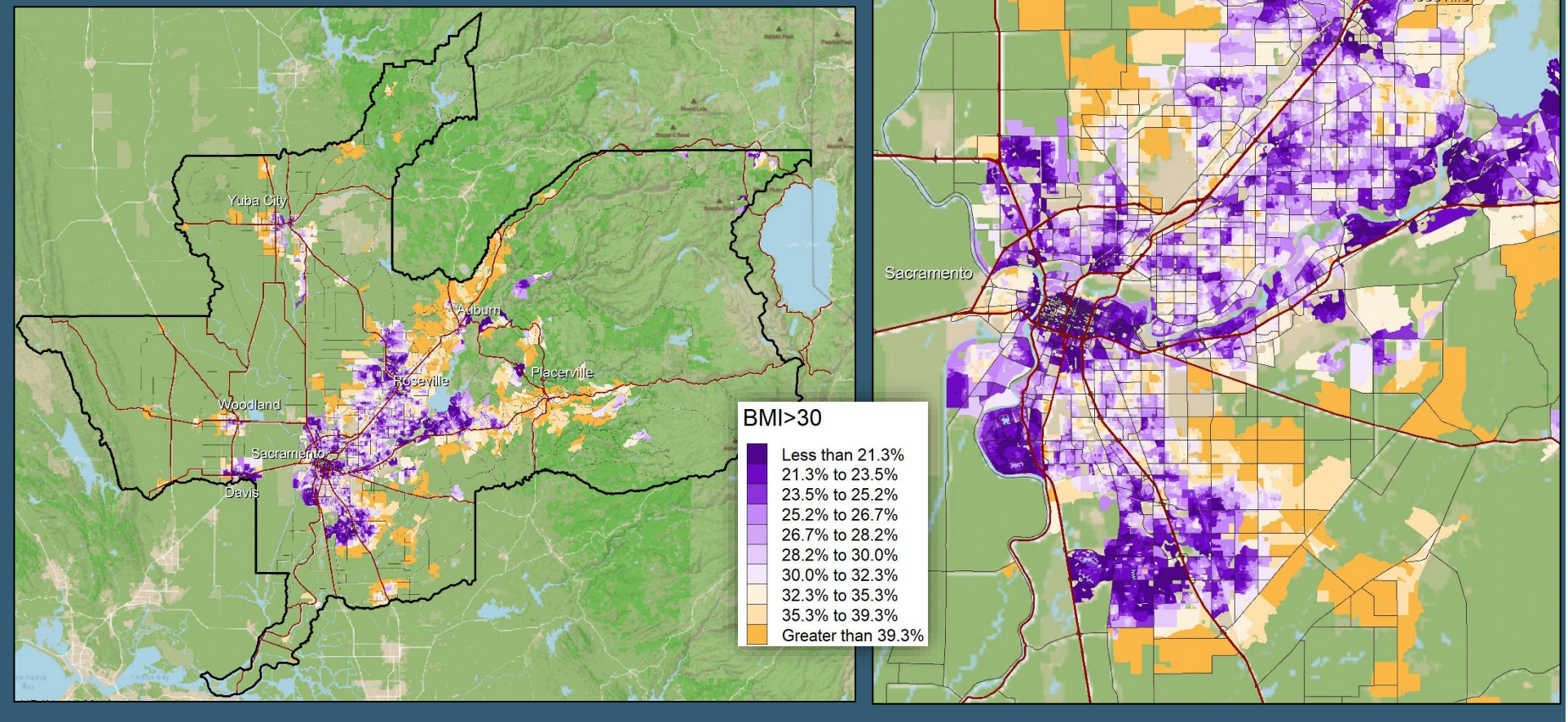


Figure 6: Estimated 2050 BMI>30 prevalence

2050 coronary heart disease

Estimated percentage of the population with coronary heart disease

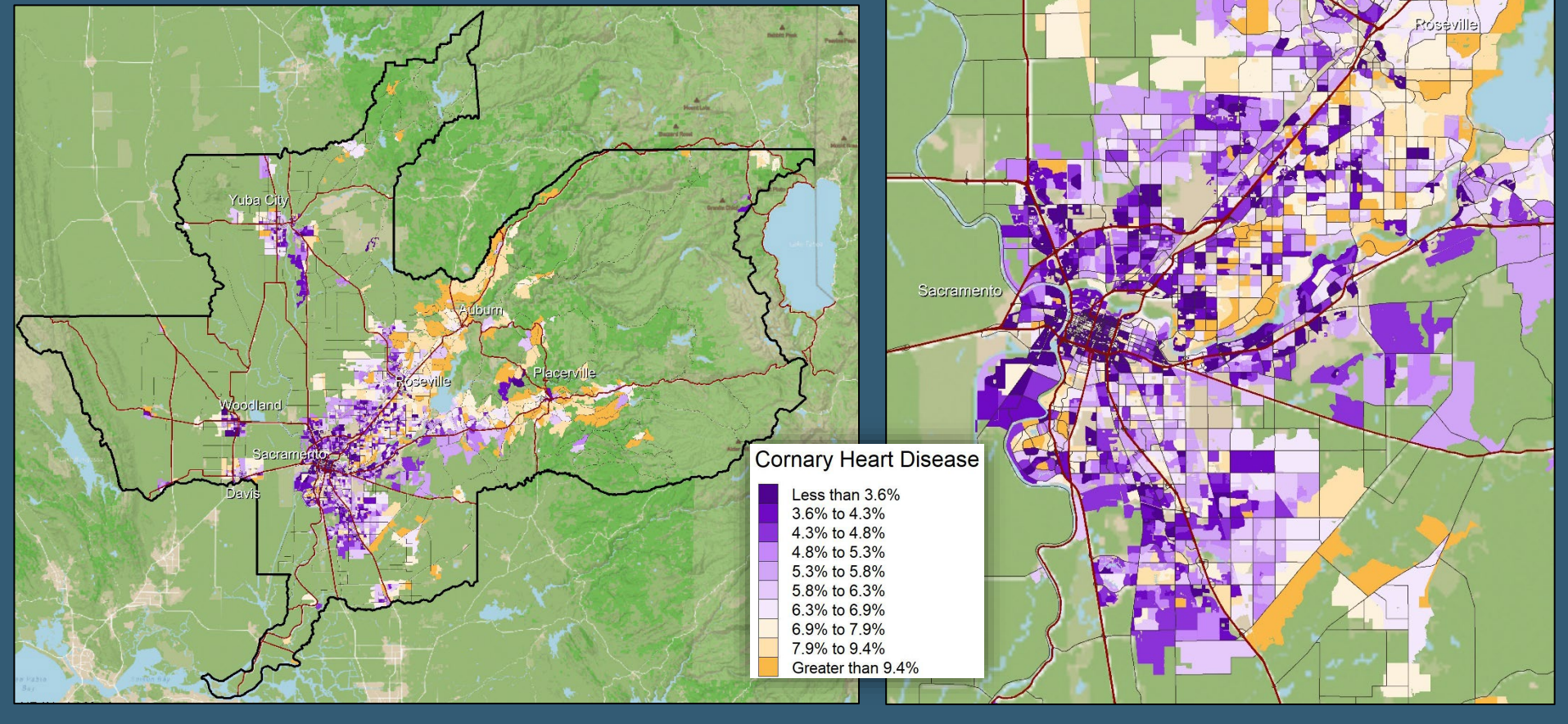


Figure 7: Estimated 2050 coronary heart disease prevalence

2050 Hypertension

Estimated percentage of the population with hypertension

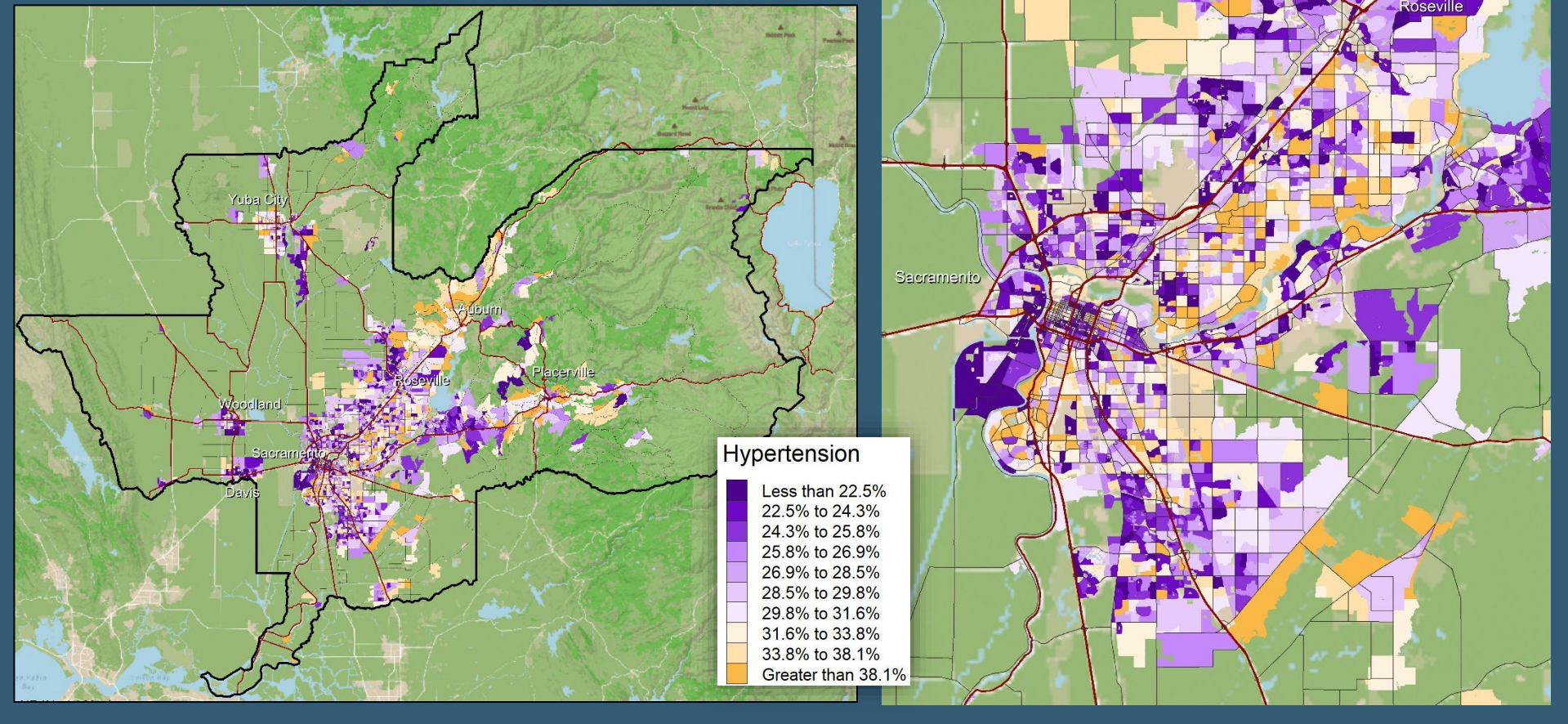


Figure 8: Estimated 2050 hypertension prevalence

2050 Type 2 Diabetes

Estimated percent of the population with type 2 diabetes

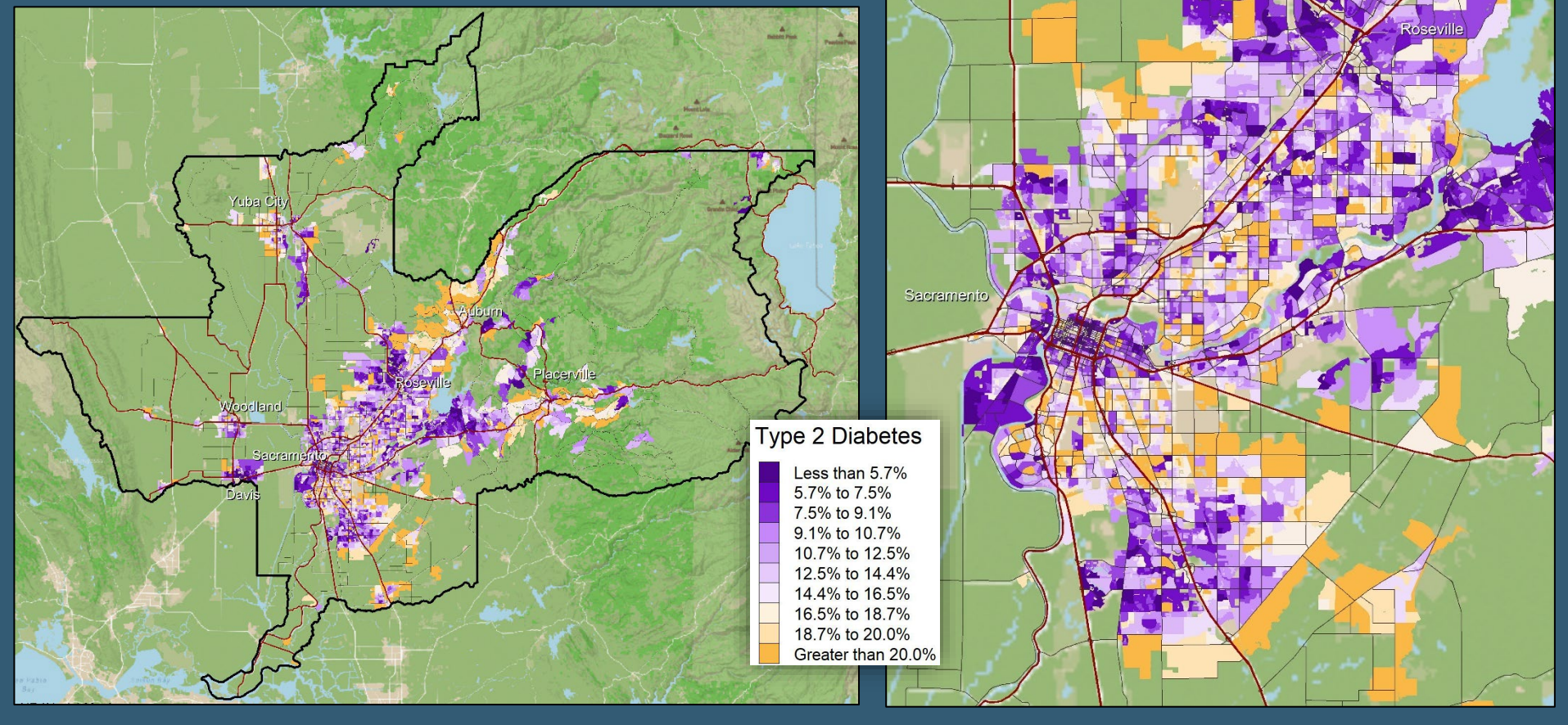


Figure 9: Estimated type 2 diabetes prevalence

2050 Annual per capita Cost of Illness

Estimated direct and indirect cost of chronic disease (coronary heart disease, hypertension, and type 2 diabetes).

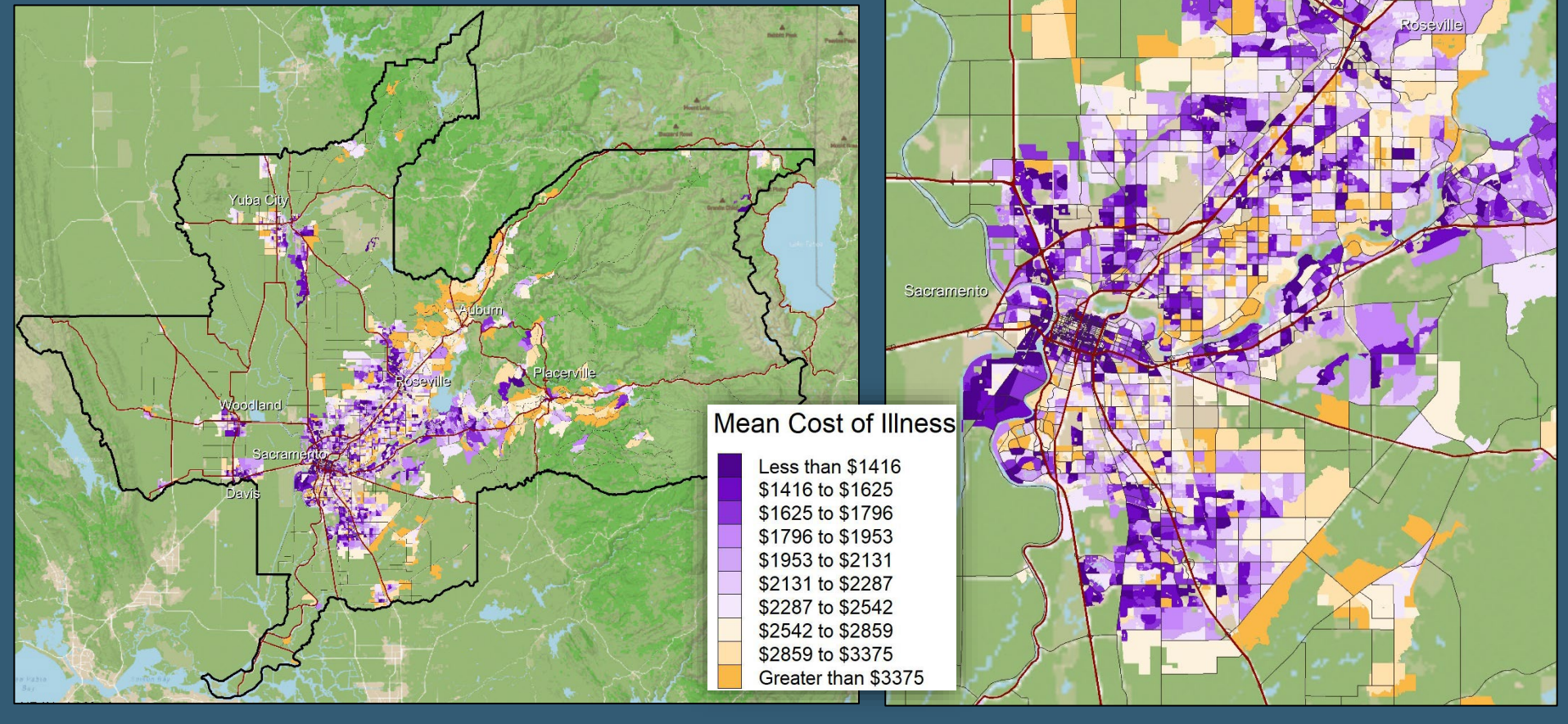


Figure 10: Estimated annual per capita cost of illness

STUDY LIMITATIONS

It is important to consider the limitations of the estimated results presented above, including:

- Health conditions are impacted by many factors, not all of which are represented in the N-PHAM statistical models.
- Models used for this analysis were built using cross-sectional data which does not account for causal impacts which could only be detected over time.
- While demographics were accounted for in the predictive models developed for each health outcome; demographics were held constant at baseline 2020 values to isolate the effect of changes to the built and natural environment. Effects of simultaneous changes to demographics on health outcomes are significant factors for future health models. Age, income, race, family type, sex, employment, and car ownership affect health outcomes yet are difficult to predict in small areas (neighborhood) yet have large potential impacts.
- Economic estimates do not capture significant indirect effects of chronic disease prevalence in communities including increased workforce productivity and land value effects of transportation/land use investments.
- Air quality impacts associated with different built-environment characteristics were captured in the modeling process developed to predict health outcomes. However, these air quality related health impacts were not captured in the application of the models within small areas or in isolation of the built environment features. More walkable places have more congestion and air pollution which can be disentangled from the health effects of the contrasting built-environment scenarios. Future research and tool development is required to separate out the effect of air quality from built environment features. The current approach conservatively discounts the potential physical activity related health benefits of walkability.

Scenario planning models apply the same methodology to evaluate different scenarios. Comparing, across scenarios, the direction of change for outcomes of interest and relative differences is useful for planning by conveying comparable actions and providing relatable order of magnitude impacts.

SUMMARY

Community health in the SACOG region is impacted by transportation planning, land use decisions, and public and private investments. Communities and neighborhoods that establish a culture of health through investments in walkability and greenspace access are more likely to result in healthier populations and a stronger and more reliable workforce.

Improving livability, health, and workforce productivity for all the region's residents is central to achieving a strong "triple bottom line". This report revealed the results of an analytical exploration of the 2025 Blueprint and how it can affect future population-level chronic disease rates and treatment costs, indicators of healthy and productive communities.

As the region adds an estimated 275,000 new housing units to support population growth by 2050, this analysis shows that placing more housing units that are closer to employment centers and mixed land uses will likely result in better health outcomes than placing these housing units in currently undeveloped areas that require costly infrastructure to be developed in a car dependent manner resulting in more sedentary time and less physical activity which are both known to have adverse and costly health impacts.

APPENDIX A: BACKGROUND ON COST OF ILLNESS

Direct Costs

Direct medical expenditures, paid by individuals/families and insurance, were estimated using the most current, publicly available data from analyses of the Medical Expenditure Panel Survey ([MEPS](#))⁷ (Table 5). MEPS is an annual, nationally representative survey administered by the Agency for Health Care Research and Quality within the US Department of Health and Human Services. It interviews households multiple times in a single year and then follows up with health care providers and insurance companies to estimate all health care expenditures associated with health conditions. Information derived from MEPS can be found in multiple ways:

- The MEPS data portal describes the mean expenditure per person with a condition in the US by ICD-10 ([International Classification of Diseases, 10th Revision, Clinical Modification](#)) summary categories, including for the following pertinent conditions: high blood pressure; heart disease; stroke (cerebrovascular disease); diabetes; COPD, asthma, and other respiratory conditions; and mental health.
- Data represents a national average. The [data portal](#) is updated annually and searchable; at the time of this report, data was available for November 2022.
- Data is reported by large age group categories (<18; 18-64; 65+ years). MEPS data is provided only for adults.

Table 5. Mean Annual Health care Expenditure per Adult (18-64) Patient from MEPS (2020, 2020\$)⁸

Category	Mean Annual Health care Expenditure per Patient
Diabetes mellitus	\$5,214
Heart Disease	\$6,678
Hypertension without Heart Disease	\$636

- Please note that MEPS data, analyzed by others, can occasionally be useful in describing current health care expenditures. Specifically, several of the researchers and organizations that provide indirect costs below also provide direct estimates based on MEPS data. Examples of this are the American Heart Association and the American Diabetes Association. There are several drawbacks to drawing direct expenditures from these analyses instead of the MEPS data portal. First, these analyses tend to lag for a couple of years. Second, while these analyses often provide state-level estimates, the state's population can impact confidence interval size. For example, the confidence intervals may be larger for a less populous state due to a smaller sample size, implying less precision in the cost estimate. For this reason, we have chosen to use the MEPS 2020 data directly from the data portal.

⁷ MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services, and how they are paid for, as well as data on the cost, scope, and breadth of health insurance held by and available to US workers.

⁸ Source: [US Department of Health & Human Services, MEPS summary tables](#).

Indirect Costs

Indirect costs associated with physical chronic diseases include lost productivity at work, short-term disability, and premature death. Indirect cost data is not nearly as consistent with different economists using slightly different definitions and methodologies. Studies tend to be sponsored by national advocacy agencies or published as journal articles.

For example, the American Diabetes Association includes workdays absent (on average 1.7 days a year per case), reduced performance at work (6.6% less productive), reduced productivity for those not in the labor force, increased rates of disability, and premature mortality. This results in an estimated annual “drag” on the US economy of \$89 billion (2017\$; \$90 billion in 2018\$) compared to \$237 billion (2017\$; \$242 billion in 2018\$) indirect costs. On the other hand, the American Heart Association has moved away from many components, relying only on lost future earnings associated with premature mortality. A recent CDC study of asthma data takes another approach, counting missed days of work or school (1.8 days for adults, 2.3 days for children annually) and premature mortality.

SAC-PHAM takes a conservative approach to estimating the economic costs of future scenarios. The table below highlights the costs included in the regional and per adult health care and indirect costs presented within SAC-PHAM.

Table 6. Chronic Physical Health Conditions – Direct and Indirect Costs for Adults

Chronic Condition	MEPS 2020 Direct Cost per Case (2020\$) ⁹	Calculated Indirect Cost per Case (2020\$)	Source & Indirect Definition	Methodological Notes
Diabetes	\$5,214	\$1,811	American Diabetes Association ^{xi} Days off work; reduced work performance; reduced productivity days; disability, and premature mortality.	The ratio of direct to indirect from 2017 as reported by ADA was applied to MEPS 2020. Please note that ADA’s direct costs are much higher than MEPS, potentially making the indirect costs significantly underestimated.
Heart Disease	\$6,778	\$10,470	American Heart Association; ^{xii}	National total indirect costs are reported for 2016-2017; the ratio of direct to indirect was then applied to MEPS 2020.
Hypertension	\$636	\$594	Lost future earnings of people who died (premature mortality) discounted at 3%.	

⁹ Source: [US Department of Health & Human Services, MEPS summary tables.](#)

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