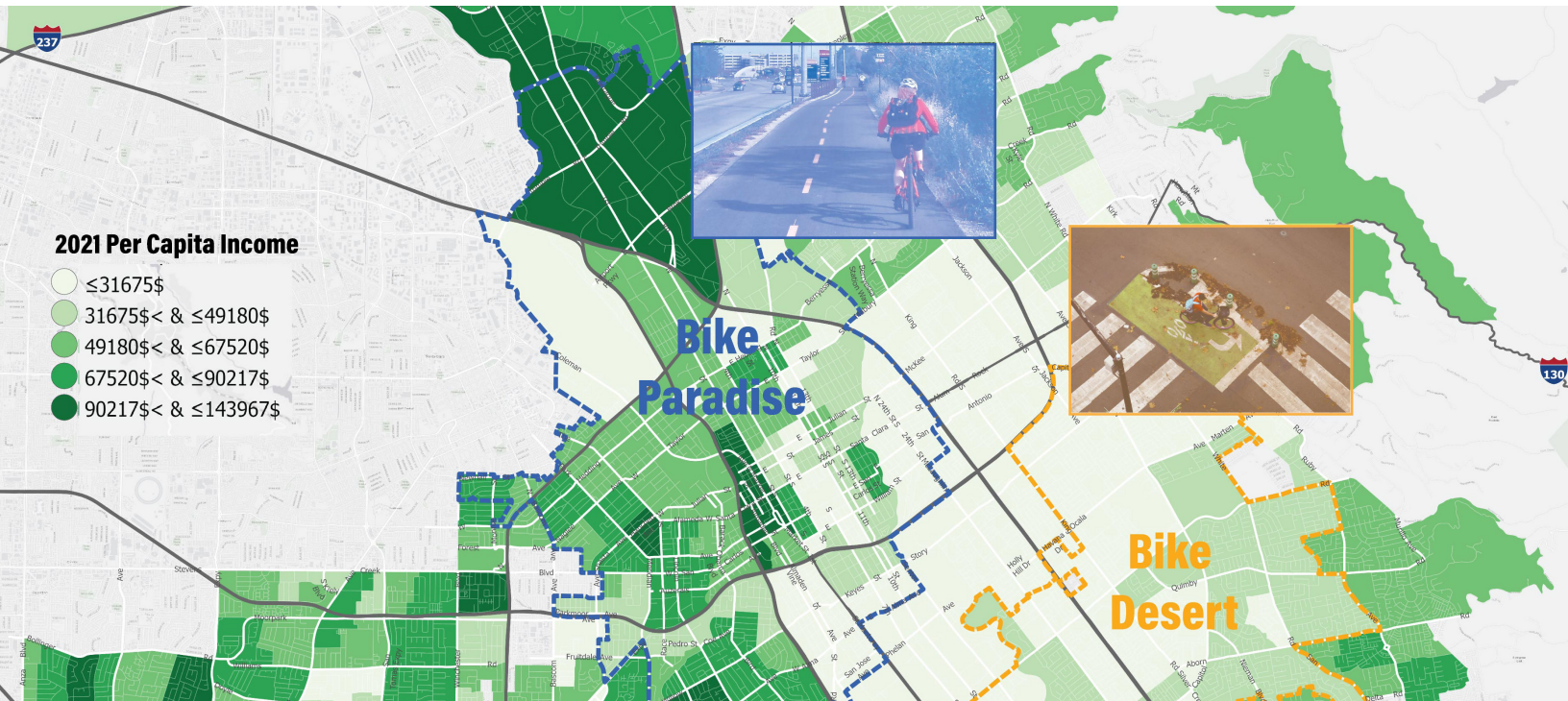# A Bike System for All in Silicon Valley: Equity Assessment of Bike Infrastructure in San José, CA

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**2021 Per Capita Income**
- ≤31675$
- 31675$< & ≤49180$
- 49180$< & ≤67520$
- 67520$< & ≤90217$
- 90217$< & ≤143967$

Bike Paradise

Bike Desert

## Introduction

The growing interest in expanding bike networks in cities and allocating funds for Bicycle Master Plans require careful planning to assess equity and to ensure a fair distribution of bike infrastructure. This means city officials need frameworks with clear workflows, instructions, and details to accurately measure the bike network's availability and quality to achieve equity goals. However, most assessment methods neglect differences in bike path classes that provide different safety and comfort levels for cyclists. This project fills this gap by using a granular bike network dataset with statistical and geospatial analyses to quantify a bike infrastructure availability score to account for the availability of bike paths as well as the variation of safety and comfort across different bike path classes in San José, California.

## Study Methods

This project answers the following questions:

1. Where are San José's best (bike paradise) and worst (bike desert) regions for cycling?
2. How different are the socioeconomic attributes of San José's bike desert and paradise residents?
3. Has San José succeeded in achieving an equitable infrastructure distribution and, if so, to what extent?
4. Has the availability of infrastructure attracted riders from underserved communities and, if so, to what extent?

The bike access score developed in this project calculates the length of bike lanes per person in each census block group, considering the comfort and stress reduction provided by different types of bike paths. For instance, a bike path protected from the street and/or sidewalk by a physical object on the street (Class IV) has the highest weight while the basic on-street bike lane with no separation has

the lowest weight. To answer Q1, we used this bike score and spatial statistics to identify the bike paradise areas (i.e., clusters of neighboring areas with significantly highest scores) and bike desert areas (clusters of neighboring areas with significantly lowest score). The bike score, desert and paradise are coupled with socioeconomic attribute data and statistical and spatial analysis to analyze the equitable distribution of quality bike infrastructure in San José (Q2). Ultimately, the bike score was used to compare against individual bike travel patterns, broken down by racial and income attributes using a StreetLight dataset to answer Qs 3 and 4.

## Findings

First, t-tests showed that the conventional unweighted bike-lane-length/per capita measurement overestimates bike infrastructure availability, which is significantly different than this project's measure. In other words, the unweighted measure across San José neighborhoods, on average, is almost three times bigger than the weighted measure calculated in this project. Second, while the bike desert and paradise areas are in proximity to each other, they are separated by Highway 101, which continues the sharp line of segregation in race and income by this highway (as found by the Assessment of Fair Housing in San José). Our statistical and spatial assessments also found strong disparities in race and income for access to bike infrastructure. San José's Asian and Hispanic populations, despite their strong population share, are predominantly located in bike deserts or in neighborhoods with poor or no access to quality bike infrastructure. By contrast, the highest per capita income neighborhoods in San José are well-served by quality bike infrastructure. However, our weighted measure of bike paths was found to have the strongest impact in our models of residents' bike use, as every percent increase in our weighted measure correlates with a 20% increase in normalized bike use (i.e., a quality bike network can attract riders). Meanwhile, our models found sidewalk availability to be a major contributor to bike use. Ultimately, Asian, Black, and low-income populations are found in our models to be the strongest users of quality bike systems.

## Policy/Practice Recommendations

Our policy/practice takeaway for San José in particular is for the City to continue their investment in urban bike networks with specific attention to the bike desert areas in this project's maps as these areas are home to Asian and low-income populations who are found to be the strongest users of a quality bike system. Our finding also confirms that the bike infrastructure measurements that do not account for infrastructure quality overestimate the availability of bike infrastructure and could lead to false assessments of the equity aspects of bike plans. This finding calls for more tested methodological frameworks with clear workflow, instruction, and details for city officials and staff to measure bike infrastructure that account for both quality and access. This report's models presented a strong affirmation of the City's efforts to establish and maintain adequate bike infrastructure by showing that its plans are succeeding in attracting users. Our models for San José also show that lacking a quality bike lane means using sidewalks, which can increase the risk of bicyclist-pedestrian collisions.

## About the Authors

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## To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2162