

SJSU CAMPUS MASTER PLAN FINAL REPORT

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URBP-279 Fall 2020
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Project Background and Objectives

San Jose, a city characterized by low-density residential development and auto-oriented travel, is rapidly urbanizing through an influx of high density residential and commercial development, major rail transportation projects, and an embrace of multi-modal street designs. It is amid this urbanization that the city's highest academic institution, San Jose State University (SJSU), located in the heart of the downtown urban core, is creating a new campus master plan to guide the future development of the SJSU campus.

The SJSU Campus Master Plan is based on a Strategic Plan called Transformation 2030, which sets out a number of goals for the plan update. These goals reflect the university's desire to adapt and grow along with the transformative economic, infrastructural, and cultural changes occurring in the city and region it serves. The SJSU Campus Master Plan will balance the need, as a public institution, of providing access to educational opportunities for a socio-economically diverse local population, while expanding the role of the university on a larger scale, enhancing its prominence and influence as an academic institution.

In collaboration with SJSU Planning, Field Paoli, and Urban Field Studio, among other collaborators, our student GIS team was tasked with utilizing GIS techniques to display a wide variety of data related to the project through effective, purposeful, and professional maps. The framing of our research was around the *campus-community interface*, or the area where the SJSU campus and neighboring communities overlap, as well as the connectivity of SJSU's Main Campus and South Campus.

Our team chose to focus on two main research topics:

Housing – Analyzing private market housing conditions near the SJSU campus to assess housing availability, viewing commute patterns to determine where students and faculty trips originate from and documenting cultural and neighborhood-serving places to highlight community vibrancy near SJSU.

Transportation – Calculate driving distance areas of regional transportation options to assess regional commuter connectivity, display local public transit options and their accessibility to the SJSU campus, and identify active and emerging modes of transportation, such as biking, skating, walking, and micro-mobility.

In applying GIS analysis to explore the topics of housing and transportation, our team has strived to highlight connectivity, livability, and community in and around the SJSU Main Campus and South Campus. We have produced several maps to visualize our findings, in hopes that they will help guide future plans related to these important topics.

Primary Outcomes

Our contribution to the San Jose State Transformation 2030 plan is to illustrate the university in the context of transportation and housing. By providing this framework, we hope to break down the barriers that separate the university from the city and encourage students to participate in the vibrancy of the city. More specifically, we aim to:

- 1) Shed the identity of San Jose State University as being a “commuter campus” through encouraging public transit use and highlight the accessibility of transit services to access the surrounding community.
- 2) Support students by exploring ideal locations for future housing developments based on transit accessibility and local amenities.



Source: Lydon George, 2020.

Project Timeline

Date	Description
September 15, 2020	The group met with Linda, Jane, and Audrey to discuss the Master Plan and potential project ideas. Linda provided a brief presentation on the analysis required for a campus master plan update.
September 29, 2020	The group met with the clients to discuss exploratory maps showing student housing data and VTA transit line data concerning SJSU.
October 5, 2020	The group met with San Jose DOT members to learn and receive information on micro-mobility corral plans.
October 20, 2020	The group cleaned a decade of student housing data and created an animation showing changes in the student population.
November 4, 2020	The group met with the clients and presented regional transportation maps, local destination maps, and renter ownership maps at 60% completion.
December 3, 2020	The group will send the 95% completed materials to the client for final alignments with the RFP.
December 10, 2020	The group will give their final presentation on the finished products.

Data Analysis

The Campus Master Plan Team shared with us several datasets for our project. Additionally, members of our group accessed public datasets and connections in the planning industry for further datasets. The sources and their provided data are:

Campus Master Plan Team:

- Student Housing Data 2010 - 2020

- SJSU building footprint data

Public Databases: Links can be found in Geodatabase Contents Section

- BART stations and routes
- Caltrain stations and routes
- ACE stations and routes
- Census data: homeownership

VTA Contact:

- Next Network Transit Lines

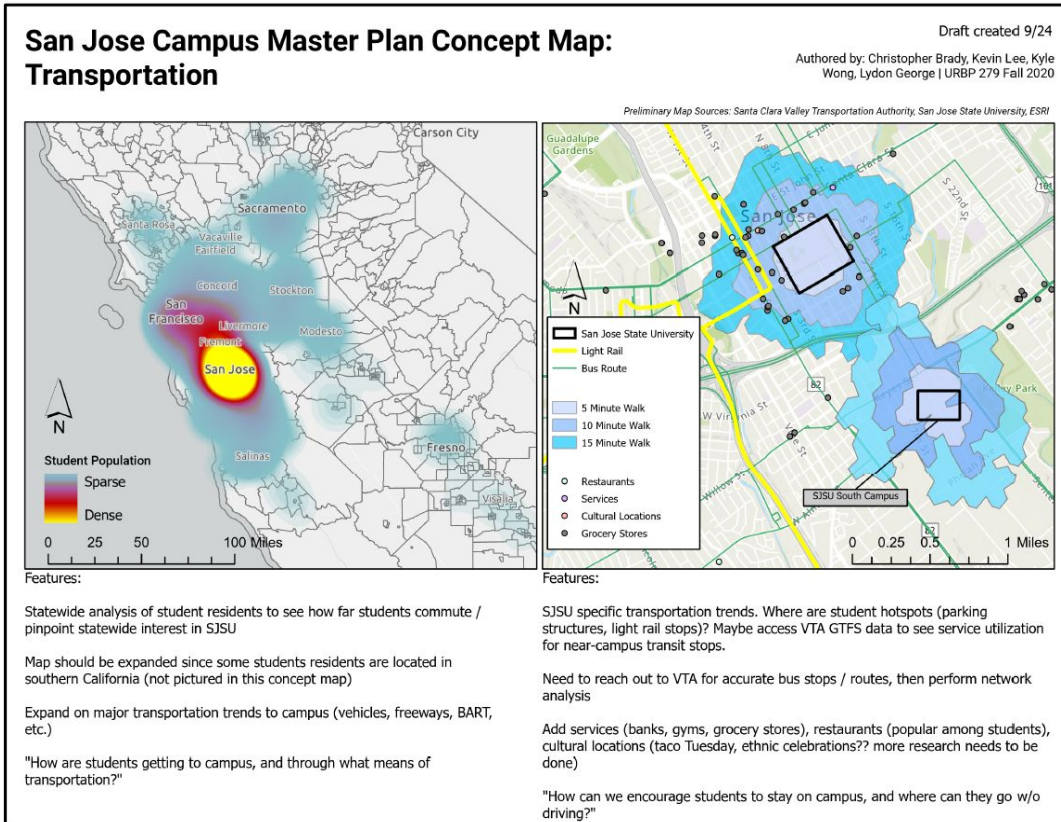
City of San Jose Contact:

- Micro-mobility corral locations through a PowerPoint presentation

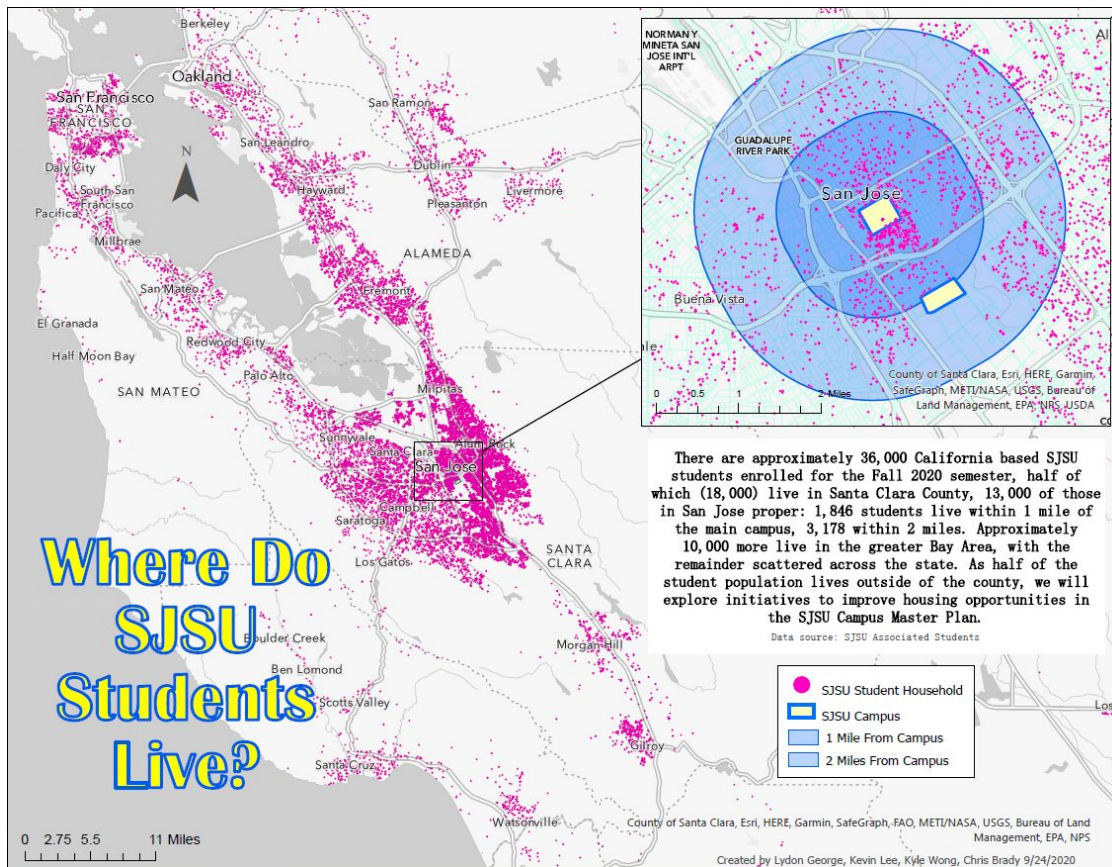
Group Created Datasets:

- Cultural destinations
- Food destinations
- Other common student destinations

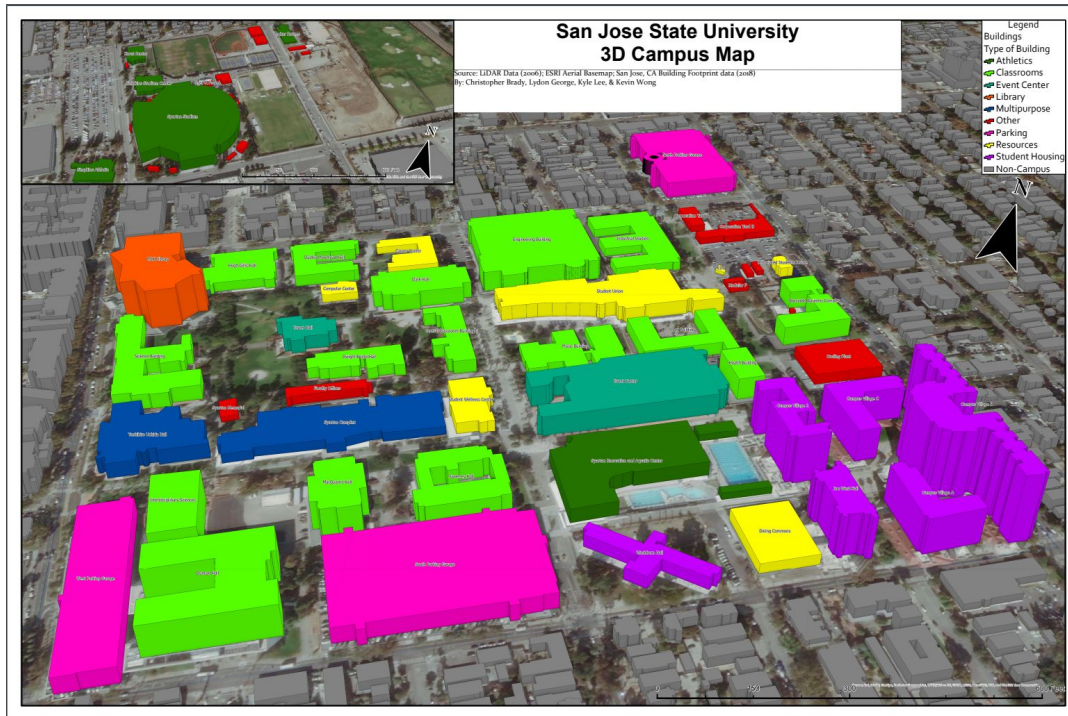
Our data analysis process started with familiarizing ourselves with available datasets. Next, our group removed all personal information, such as name, email, and SJSU ID number. Cleaning was conducted using Excel and manually deleting all columns with said sensitive information. After the initial data cleaning, our group identified housing and transportation as primary representations of the community-campus interface and created exploratory maps showing San Jose State's impact on a regional and local scale. As new datasets were made available, these maps changed and drastically, but these exploratory maps created a foundation for our final products. Our group experimented with different graphical data representations and settled on creating an array of maps, an animation, and a web map for easier spatial analysis.



Exploratory Map 1: Concept map showing a heatmap of Fall 2020 student location data from SJSU Enrollment (left) and a preliminary SJSU campus community interface map (right).



Exploratory Map 2: A concept map showing Fall 2020 student residences provided by SJSU Enrollment.



Exploratory Map 3: 3D Model of SJSU

Team-Based Approach

Working as a group on this project, each member understood the need to establish consistent, effective communication from the very beginning. Our first step was to set up weekly Zoom meetings to achieve this end, allowing us to interact, review our work, and discuss the next steps. We used Asana, an online project management portal, to organize all tasks and deliverables in a central place, as well allowing us to view overall progress. During the week, we would communicate via text or email as needed, understanding our often conflicting schedules in response times. We also took the time to get to know each other's work ethics and personalities, helping us to understand and respect one another's emotional and mental boundaries.

Our GIS work was divided into two categories: Local Maps and Regional Maps. Based on the data we were able to attain, as well as the different aspects of housing and transportation researched, we created twelve maps in total, dividing the work accordingly.

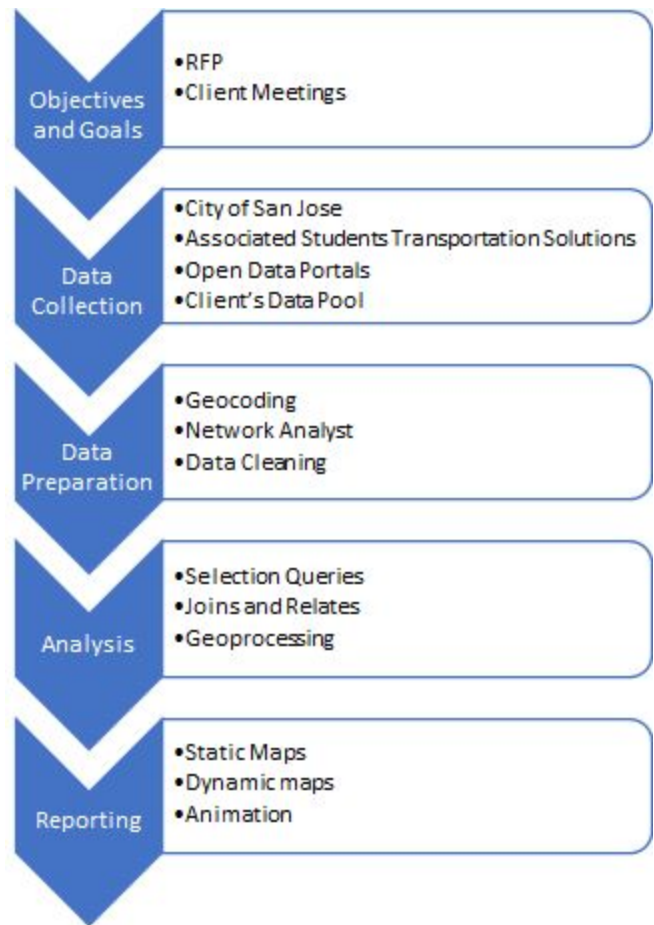
Methodological Summary

The methods used to create our maps followed a similar general process. Keeping the objectives of the client in mind, we wanted our maps to capture the campus-community interface and reveal patterns in transportation and housing at the regional and local scale. The

main datasets that we relied on are student residences acquired through SJSU enrollment data and parking permit purchase data provided by Parking Solutions.

The Masterful Blue Planners are incredibly grateful to the university for providing the team with student enrollment data spanning from 2010 to 2020. The raw data contains obfuscated student IDs, complete address data, and enrolled semester. To protect student privacy, our published maps do not reveal these specific addresses and only analyze student locations from the zip code level.

The raw parking permit data consisted of two Excel files provided by SJSU Parking Solutions, one from the fiscal year 2019 and one from the fiscal year 2020. The team decided to utilize the fiscal year 2019 dataset due to our aims to perform analysis with pre-COVID conditions. The fiscal year 2020 dataset contained purchases from July 2019 to June 2020, which would have been greatly impacted by SJSU's transition to online-only classes. The fiscal year 2020 dataset had obfuscated IDs, purchaser zip codes, and purchase time and date. Unique zip codes were extracted from the original dataset and a count for each was generated which allows us to perform a join to observe the number of permit holders at the zip code level.



Local

Besides the major parking permit and student enrollment datasets, the local maps looked to incorporate other data sources to explore the campus-community interface at the local level. We used transportation-related datasets through the Valley Transportation Authority (VTA) open data portal for VTA light rail and bus stops and routes, as well as bicycle facilities. Having these elements on the map creates a picture of how the university campus is connected with the surrounding downtown area or how disconnected they are (such as the lack of transit options for the south campus). We also used Bay Area Rapid Transit (BART) data for proposed stations and service expansions into the South Bay region, as this would impact transportation modes for students.

As requested by the client, we looked into identifying and geocoding the regional “draws” to explore how the university fits into the fabric of the community. This includes theatres, recreation centers, sports arenas, and cultural centers; places that invite residents, visitors, and students alike to enjoy the signs and sounds of the city. By using the city of San Jose’s website and Google Maps, we compiled several of these regional draws and observed their proximity to the university. Parks and open spaces can serve as both a local and regional draw, their boundaries obtained through the San Jose GIS open data portal.

We also looked into “local services,” or places that provide the community around SJSU with basic amenities such as grocery stores, gyms, drugstores, and banks. These locations were found using basic search queries in Google Maps and were subsequently geocoded.

Restaurants also play an integral role in the local life through food and culture and we wanted to capture that by geocoding approximately 100 establishments near SJSU. These restaurants were chosen based on their Yelp rating (minimum 100 reviews, 4 stars) and the respective attribute table also includes phone numbers and take-out services. An accompanying web-map was created to look into the details of each establishment that could not be displayed on a static map: <https://arcg.is/1WKb9X0>.

To showcase high opportunity rental areas near SJSU, and as well display an informal boundary where students are less likely to live, American Community Survey data was obtained to provide the number of owner-occupied and renter-occupied units in the block groups within two miles of SJSU.

Regional

In reflection of SJSU’s sustainability goals to reduce driving mode share to 25% by 2025, our group sought additional analysis into potential public transportation ridership. The student data for this process consisted of previously geocoded Fall 2020 data. We did not use older datasets because of the high cost of geocoding thousands of data points. For this process, we used the publicly available transportation station data and ESRI’s Network Analyst to create 10-minute driving distance areas around each station. Using a Spatial Join with the student housing data, we counted the number of student home addresses within a distance polygon and. These driving distance areas and the Clip Tool were used to extract the Parking Permit by Zip Code dataset to visualize the concentration of parking permits near a public transportation station. The regional public transportation analysis excluded stations within the City of San Jose since VTA services are free to students using the SmartPass.

Our group used the VTA Next Network dataset for similar local analysis on parking permit data and public transportation. We used the routes listed on the Associated Students Transportation Solutions website and created definition queries that filtered out bus stops and light rail stations from unwanted routes. Using Network Analyst, we created 10-minute walking distance areas around the remaining stops and stations. Afterward, we used the Clip Tool and extracted the Parking Permit by Zip Code dataset to show the concentration of parking permit purchases

within areas serviced by public transportation. Additionally, another variation of analysis was conducted by normalizing parking permit numbers using student count numbers.

After the preliminary analysis, each of the parking permit layers were normalized using student location data by zip code. This was done through data table Joins, creating a new field in the data table, and using the Calculate Field tool. The expression used was "Field = "permit_count" / "student_count". Through this normalization, the maps suggest which locations have the greatest population percentage commuting by motor vehicle.

Geodatabase Contents

Name	Description	Source
Enrollment_Fall2020	This file contains a list of Fall 2020 student self reported addresses throughout the world. This data was accurate as of June 2020. The data was originally obtained as a CSV file from SJSU enrollment through AS-TS. The attributes fields of this data are "Address", "City", "State", and "Zip Code". These fields were used in the geocoding process to obtain the represented point data symbolized in the map and for heat map expression.	Data was accessed through email coordination with SJSU campus. Data originated from Enrollment and was geocoded by Associated Students Transportation Solutions
SJ_Bus_Routes	This file contains a list of the VTA transit routes within the City of San Jose. A notable attribute field is "short_na_1" which has the bus route's identifying route number. These transit routes are not set as VTA is adapting to COVID-19 conditions and preparing for 2021.	Data was accessed through email coordination with VTA staff.
SJ_Light_Rail	This file contains a list of the VTA light rail routes within the City of San Jose. A notable attribute field is "short_na_1" which has the line's identifying color title.	Data was accessed from VTA open data portal
San Jose State University	This file contains a feature created for the university. This feature was made by tracing the ESRI basemap.	Data was created by tracing the ESRI basemap.
2019 TIGER Zip Code	Zip code boundaries as defined by the Census Bureau. Raw data file contained zip codes across the entire county.	US Census Bureau: https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html
VTA Bus Routes	This file contains a list of all VTA bus routes. A notable attribute field is	Data was accessed through the VTA Renew database.

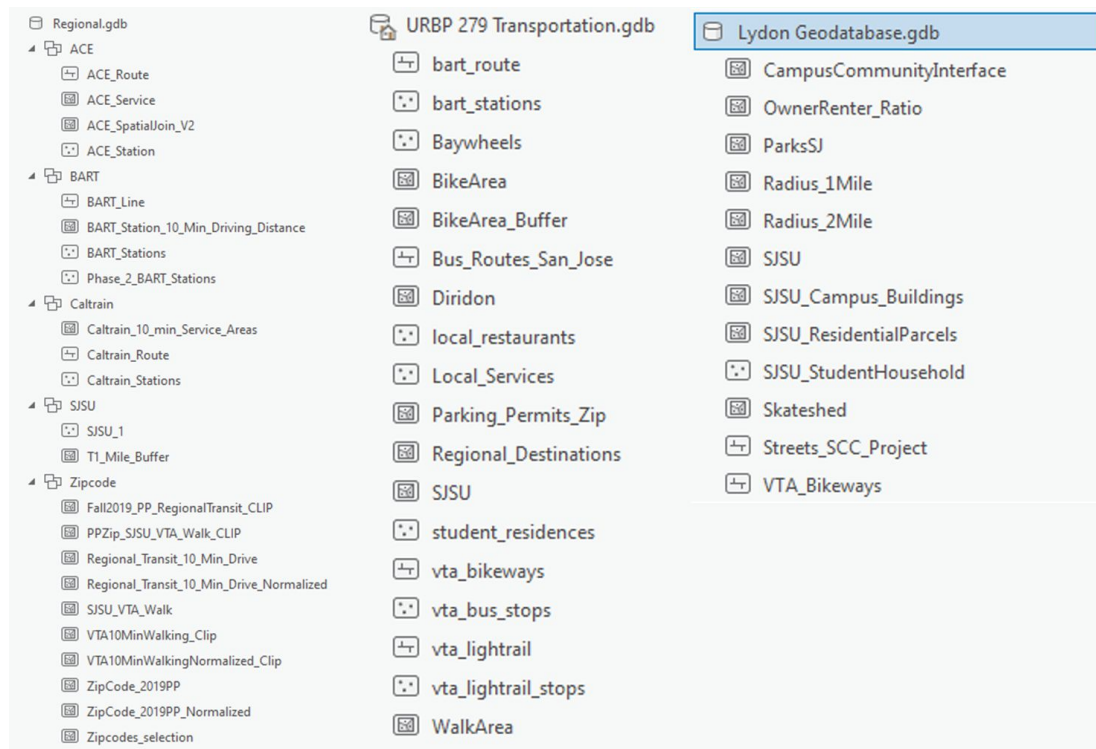
	"short_na_1" which has the bus route's identifying route number.	
VTA Bus Stops	This file contains a list of all VTA bus stops. Attribute data shows bus stop environment features such as ADA access, curb quality, and bench padding.	VTA Open Data Portal
VTA Light Rail	This feature displays all the light rail transit routes under the jurisdiction of VTA. Light rails can also be identified by city and route color.	VTA Open Data Portal
VTA Light Rail Stops	This point layer displays light rail stops that are a part of Valley Transportation Authority's light rail transit network. Last Updated: November 2020.	VTA Open Data Portal
Regional_Destinations	Polygon features of "regional draws" located in San Jose. Locations were selected by browsing through the city of San Jose's website and geocoded using coordinate data extracted from Google Maps. Not intended to be an exhaustive list. Last Updated: November 2020.	https://www.sanjose.org/things-to-do
ACE_Service	This file contains a list of ACE station 10-minute service driving areas with student counts within them.	This layer was created using Network analyst and ACE station data from https://gis.data.ca.gov/datasets/63697b01616b4df68e2b316e73d7a4d6_0
BART_Service	This file contains a list of BART station 10-minute service driving areas with student counts within them.	This layer was created using Network analyst and BART station data from https://www.bart.gov/schedules/developers/geo
Caltrain_Service	This file contains a list of Caltrain station 10-minute service driving areas with student counts within them.	This layer was created using Network analyst and Caltrain station data from the San Mateo county data located at https://data-smcmaps.opendata.arcgis.com/datasets/8b8f2f498353438eb41c09e618f68be1_1
ACE_Route	This file contains a polyline representing the ACE train route.	https://gis.data.ca.gov/datasets/63697b01616b4df68e2b316e73d7a4d6_0
BART_Route	This file contains a polyline representing BART routes, including proposed service extensions into Santa Clara County. Last Updated: November 2020	https://www.bart.gov/schedules/developers/geo
Caltrain_Route	This file contains a polyline representing the Caltrain route.	https://data-smcmaps.opendata.arcgis.com/datasets/8b8f2f498353438eb41c0

		9e618f68be1_1.
ACE_Stations	This file contains point data representing ACE stations.	https://gis.data.ca.gov/datasets/63697b01616b4df68e2b316e73d7a4d6_0.
BART_Stations	This file contains point data representing BART stations, including proposed stations planned for expansion into South Bay. Last update: November 2020.	https://www.bart.gov/schedules/developers/geo.
Caltrain_Stations	This file contains point data representing Caltrain stations.	https://data-smcmaps.opendata.arcgis.com/datasets/8b8f2f498353438eb41c09e618f68be1_1.
Regional_DrivingDistanceArea	This file contains a union of ACE, BART, and Caltrain 10 minute driving distance areas.	This layer was created using the ACE_Service layer, the BART_Service layer, the Caltrain_Service layer, and the Union tool
VTA_SJSU_Service	This file contains a 10-minute walking distance polygon from all stations on VTA bus or light rail routes that directly travel to the SJSU campus area. The routes used are recommended by AS-TS.	This layer was created using VTA_Light_Rail, VTA_Bus_Routes, and Network Analysis.
Bike_Area	This polygon layer shows the area that can be accessed by biking for 15 minutes from the center of the main or south campus. Areas were generated using ESRI's Network Analyst using a bicycle speed of ~10 mph.	This layer was created using Network analyst.
Walk_Area	A 15-minute walk area was generated using Network Analyst in ArcGIS Pro, indicating the distance a person could travel at ~3 mph from the center of campus.	This layer was created using Network analyst.
Local_Services	A point layer of gyms, grocery stores, and drug stores around San Jose State University. Data was extracted from Google Maps and Yelp.	Google Maps, Yelp.com

local_restaurants_sjsu	As part of the local services component of the SJSU Master Plan Project, this point layer displays local restaurants surrounding San Jose State University. Restaurants were selected by number of reviews (min: 100) and average rating (4 stars or higher) on Yelp. Coordinate data was extracted from Google Maps. This list is not exhaustive of all restaurant options around SJSU.	Yelp.com, Google Maps
Parking_Permits	A polygon layer of the number of parking permits purchased in fall 2019 (August to December) represented at the zip code level. Parking permit data was provided by SJSU Parking Solutions which included addresses. Addresses were dissolved by zip code and joined to zip code boundaries provided by the US Census Bureau.	SJSU Parking Solutions, US Census Bureau
VTA_Bikeways	A line layer of existing bikeways in Santa Clara County under the jurisdiction of VTA. Features were dissolved to combine bi-directional paths.	https://data.vta.org/datasets/santa-clara-county-existing-bikeways-2020
Skateshed	Polygon buffer depicting service area for 5 and 10 minute skate trips from SJSU Main Campus. Generated with Esri Network Analyst.	ArcGIS Pro Network Analyst - Esri
OwnerRenter_Ratio	Block groups within a 2 mile radius of SJSU, containing a ratio of owner occupied housing units over renter occupied housing units.	American Community Survey
SJSU_ResidentialParcels	Parcels within a 2 mile radius of SJSU that are within residentially zoned areas.	Derived from Zoning Data and Parcel Data.- SJ GIS Open Data Portal
SJSU	Represents San Jose State University main and south campuses.	Created using the Make Feature tool and tracing the ESRI basemap.
SJSU_1milebuffer	Represents 1 mile buffer around SJSU main campus.	Created using the Buffer Tool.
CampusCommunityInterface	Displays the boundary of the SJSU Campus-Community Interface	Drawn in ArcGIS

SJSU_Campus_Buildings	Building parcels on SJSU campuses	SJ Parcel Data - SJ GIS Open Data Portal
SJSU_StudentHousehold	Point data representing student addresses provided through student enrollment data.	SJSU Associated Students
Streets_SCC_Project	Line data displaying streets in Santa Clara County	Santa Clara County Open Data Portal

Geodatabase Images:



Map Products

Local

Local Transportation Network - Includes bus, BART, light rail routes, and stops overlaid on top of a walk area to indicate the pedestrian accessibility of a university student on campus.

San Jose State University Local Micro-mobility - Shows the potential of using micro-mobility (bicycles, electric scooters, mopeds, etc.) to access the surrounding community. Also features bikeways and bus infrastructure to show campus-community connectivity.

San Jose Community Destinations - Regional Draws - Specifically shows the regional “draws” surrounding SJSU including the proposed Google project, San Pedro Square, and the Japanese Friendship Garden among others. An accompanying web map can be accessed here: <https://arcg.is/1WKb9X0>.

San Jose Community Destinations - Local Services - Specifically shows the local services and restaurants around the university including banks, retailers, and drugstores. An accompanying web map can be accessed here: <https://arcg.is/1WKb9X0>.

Housing (renter/owner, demographics, potential areas of future housing projects) - Displays the ratio of owner-occupied housing units to renter-occupied, overlaid with residentially zoned parcels and student households to show where rental units are more available, where housing is available, and where students actually live.

Skateboarding to SJSU - As a nod to the SJSU campus culture of skateboarding, “Skatesheds” for areas within a five and ten-minute ride on a skateboard to campus are displayed, using an estimated travel speed of 8 miles per hour in ArcGIS Pro’s Network Analyst function.

SJSU Campus-Community Interface - Displays an estimated boundary as to where campus life and community life interact and integrate, determined by assessing housing, transportation, and local services data.

San Jose State 3D Campus Map- Shows both the Main and South Campus, with each building symbolized by ‘Building Type’, and clearly labeled. This is on top of an aerial imagery basemap, to help show how the surrounding landscape looks. An accompanying web scene can be accessed here: <https://arcg.is/0TmeW4>.

Regional

Students and 10 Minute Driving Distance Map (ACE) - This map shows the concentration of student home addresses within a 10-minute driving distance from an ACE station outside of San Jose. The highest student concentrations observed were in Tracy and Pleasanton. This percentage of total students within the driving distance area was 9%.

Students and 10 Minute Driving Distance Map (BART) - This map shows the concentration of student home addresses within a 10-minute driving distance from a BART station outside of San Jose. The highest student concentrations observed were in Union City, Fremont, Milpitas, and Santa Clara. This percentage of total students within the driving distance area was 22%.

Students and 10 Minute Driving Distance Map (Caltrain) - This map shows the concentration of student home addresses within a 10-minute driving distance from a Caltrain station outside of San Jose. The highest student concentrations observed were around Lawrence station and Bayshore Station. This percentage of total students within the driving distance area was 14%.

Parking Permit by Zipcode and Regional Transportation- This map shows the concentration of parking permits by zip code within a 10-minute driving distance from regional transportation stations. The highest concentration observed was in Milpitas.

Parking Permit by Zipcode and Regional Transportation (Normalized)- This map shows the concentration of parking permits (Fall 2019) over the concentration of students (Fall 2019) by zip code within a 10-minute driving distance from regional transportation stations. The highest concentration observed was in Milpitas.

Public Transportation Service (VTA bus stops and stations)- This map shows the concentration of parking permits by zip code within a 10-minute walking distance from local public transportation stops and stations that travel directly to San Jose State University. The highest concentration observed was in the following zip codes: 95112, 95127, 95128, 95121, and 95111.

Public Transportation Service (VTA bus stops and stations) (normalized)- This map shows the concentration of parking permits over student count by zip code within a 10-minute walking distance from local public transportation stops and stations that travel directly to San Jose State University.

Other

3D map of SJSU Campus + South Campus- This map displays campus and non-campus buildings with building names. The purpose of the 3D map is to showcase the campus as a prominent landmark in the downtown San Jose community, something that is not effectively told through a 2D map.

Student Residence Distribution - A simple heatmap of student residences within California based on Fall 2020 enrollment data. Student addresses are self-reported and may not represent the current location of students.

San Jose State University Parking Permit Purchases by Zip Code - This map displays the number of university parking permits based on the purchaser's zip code, representing the distribution of automobile commuters in the Bay Area. Parking permit data is provided by Parking Solutions.

San Jose State University Parking Permit Purchases by Zip Code (Normalized)- This map displays the number of university parking permits over student counts based on the purchaser's

zip code, representing the distribution of automobile commuters in the Bay Area. Parking permit data is provided by Parking Solutions.

SJSU Student Residence Trends 2010 - 2020 Animation - This map presents the distribution of San Jose University student residences at the zip code level from 2010 to 2020. The animation is also accompanied by a graph showing total enrollment totals.

Map Analysis and Insights



Source: Lydon George, 2020.

In creating this collection of maps, we sought to visualize the various ways that SJSU students connect with the SJSU campus by focusing on patterns of *housing* and *transportation*. Student enrollment data, reflected in the Student Residence Distribution map, shows us that students mainly live in the Bay Area, specifically Santa Clara County, but come from, and may currently live, in other areas across the state. To further understand the dynamics of campus connectivity, we divide the analysis into *local* and *regional* scales.

Local analysis was integral in determining the general area of the *campus-community interface*, or the area where campus life and community life integrate. The **Owner/Renter Ratio** map

shows that the neighborhoods one mile north and south of Main Campus, their lighter color indicating a higher rental unit to owner unit ratio, provide the most rental opportunities for students living off campus. **Local Services** and **Regional Destination** maps show that many desired community resources are present within this one mile radius, while the **Skateboarding, Local Transit, and Micro-mobility** maps highlight the multimodal transportation and connectivity in this same area.

Combining these factors of *housing availability, cultural destinations, and connectivity*, we are able to determine that the *campus-community interface sits within a **one-mile radius** of Main Campus*, with approximate borders of Taylor St to the north, 14th St to the east, the 280 freeway to the south, and Highway 87 to the west. This area serves the housing, transportation, and cultural needs of SJSU, the relationship to the campus dissipating beyond this informal border.

Regional analysis provided insights into how the student population living outside of the campus-community interface is able to connect to the SJSU campus. The **Parking Permit Purchases by Zip-Code** map displays data for the nine county Bay Area, showing the highest concentration of permits being purchased within Santa Clara County and south Alameda County, areas with ample public transit connectivity. This point is underscored by the **Parking Permit Near Local Transit** map, which draws attention to the high number of parking permits purchased in zip-codes within and just outside the campus-community interface. The **Parking Permit: Regional Direct Lines and 10 Minute Driving Distances** map also supports this point, where higher numbers of parking permits were issued in parts of neighboring counties with nearby regional rail service. The **Ten Minute Drive Area** maps for BART, Caltrain, and ACE regional rail systems display the percentage of enrolled students living in areas within a ten minute drive of a train station, which are 22%, 14%, and 9% respectively. The collective message of these maps is that *there are significant opportunities for students who drive to campus to use local and regional transit services for their commute*.

The combination of the local and regional analysis speaks to larger trends in how students access campus, one that aligns with the long-held perception of SJSU as a commuter school. The campus-community interface contains the basic elements of a vibrant, livable community, providing multi-modal connectivity to local services and regional destinations, but housing options are limited by inadequate housing stock, cost, and availability. Regionally, parking permits are purchased by students living in all parts of the Bay Area, but primarily within San Jose, Santa Clara County, and nearby areas, all with some form of public transit connectivity to SJSU. This identity of SJSU as a “commuter school” is partially perpetuated by the low barriers to parking on campus.

One can imagine if the infrastructure dedicated to parking on the main campus was instead prioritized to be replaced by housing, it would provide more students with a richer academic and social experience at SJSU. The south campus sits at a comfortable one mile distance from the main campus, is well connected through bike lanes and shuttle services, and has the potential to be reestablished as the primary parking lot for regional commuters, or even a site for

additional housing. Currently, SJSU offers free local transportation through VTA and discounted rides on regional rail service, alternatives that are often overlooked by students due to the convenience of on-campus parking.

In recent years, housing shortages and housing costs in the Bay Area have reached unprecedented levels. Students at SJSU struggle to keep up with these rising housing costs, or to simply find available housing, forcing many to live further away and commute to campus. This form of “displacement” contributes to local traffic congestion that has also become commonplace across the region, causing detrimental effects on the environment, and physical and mental health. Unfortunately, student homelessness has become an increasing issue at SJSU, one that should be unfathomable for “Silicon Valley’s Public University”. The linked problem of housing scarcity and persistent traffic congestion have become so pervasive in the Bay Area and San Jose that it would be unconscionable for the main institute of higher learning, located in the urban center of the largest city in the region, to not be on the progressive forefront in addressing them.

By 2030, BART is expected to expand into downtown San Jose, Google is planning to have completed their Downtown West campus, and the California High Speed Rail will be closer to connecting the Bay Area to Southern California through a short train trip. Through the Campus Master Plan, SJSU has the opportunity to transform along with downtown San Jose, to embrace its location in the city’s urban core and assume its responsibility, as a public university, to facilitate the progress and development of the community it serves. By optimizing housing opportunities, while prioritizing multi-modal transit accessibility, SJSU can further connect its university population with the downtown area, contributing toward a more vibrant, integrated community.

Methodological Limitations

- Student resident data and parking permit data are limited by what students submit and may not reflect the true accuracy of their location. E.g., students may be renting a room in the San Jose area but their permanent address is in southern California. One way to remedy the situation is to follow up directly with out-of-county residents to correct the information, which is not feasible for our project at the moment.
- A good number of buildings were missing heights within the Building Footprints geodatabase. The LiDAR data used to find the missing heights is from 2006, so there were certain buildings whose height could not be found through this method. For those buildings, google maps was used to navigate the campus and help give a height estimation for these buildings. So while most of the heights are exact, there are a few which are rough estimates. Moreover, for a few buildings the LiDAR data indicated different heights, in this instance, the average of the heights was taken to determine the height of the specific building.

Client Meeting Outcomes

1st Meeting - 9/15/2020	<ul style="list-style-type: none">• Team introductions• discussion of project expectations, and deliverables• Point-of-contacts established and preliminary data exchanged
2nd Meeting- 9/27/2020	<ul style="list-style-type: none">• 30% maps exploratory maps shown• Discussion of possible approaches and future datasets
3rd Meeting - 11/4/2020	<ul style="list-style-type: none">• 80% maps shown with feedback received.• Discussion of acquired datasets and datasets being processed. Indicated what final deliverables will look like.

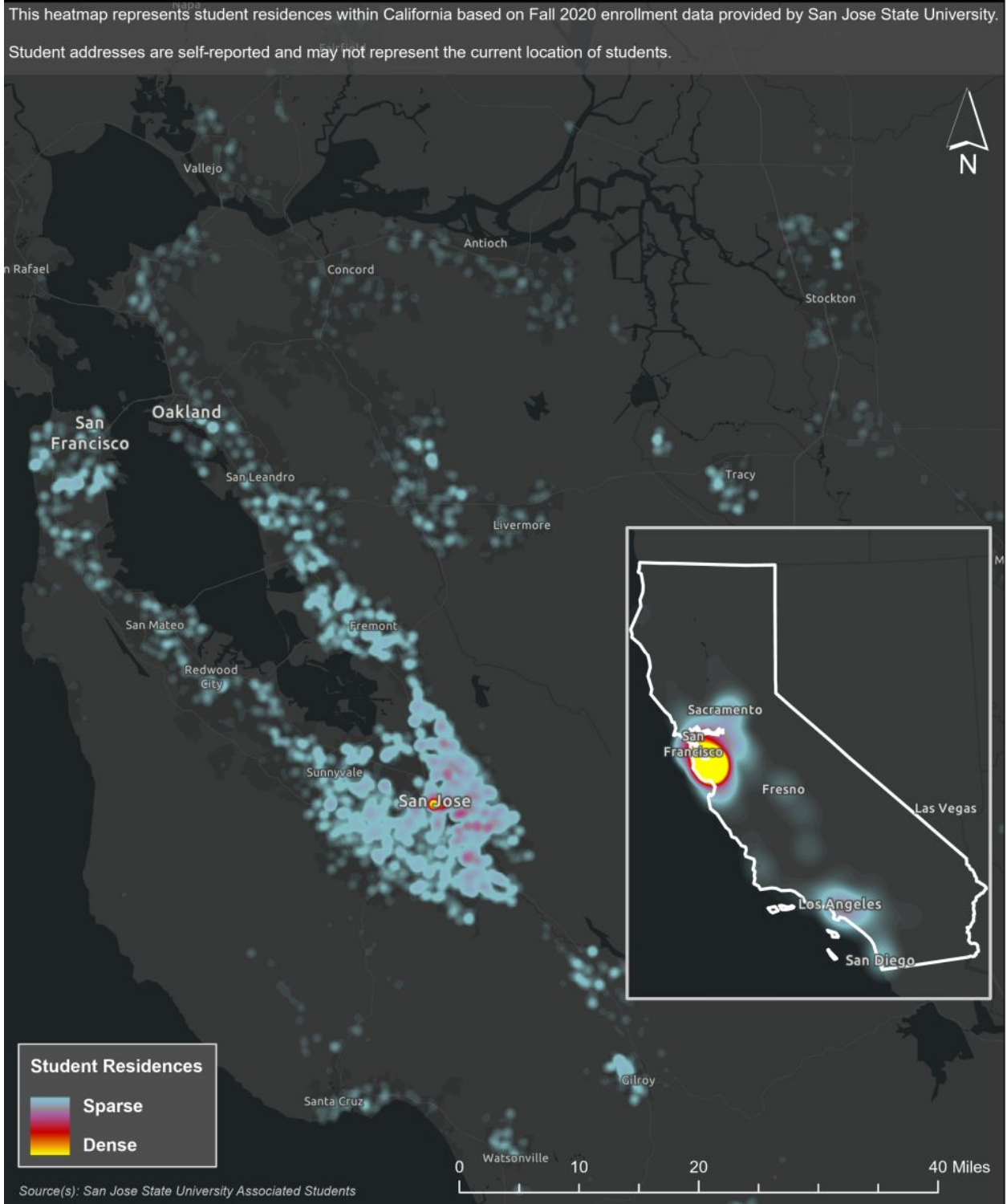
Suggestions for Future Research

- Look into the economic effect of transforming on-campus parking structures to housing developments for students. How will this affect student parking permit purchases and traffic patterns around the campus?
- How many students, faculty, and staff will shift their means of transportation with expanded transit awareness and accessibility? Can the state be provided subsidies for alternative transportation?
- How can the city and the university cooperate in addressing shortcomings in micro-mobility infrastructure?

Completed Maps Gallery

Student Residence Distribution

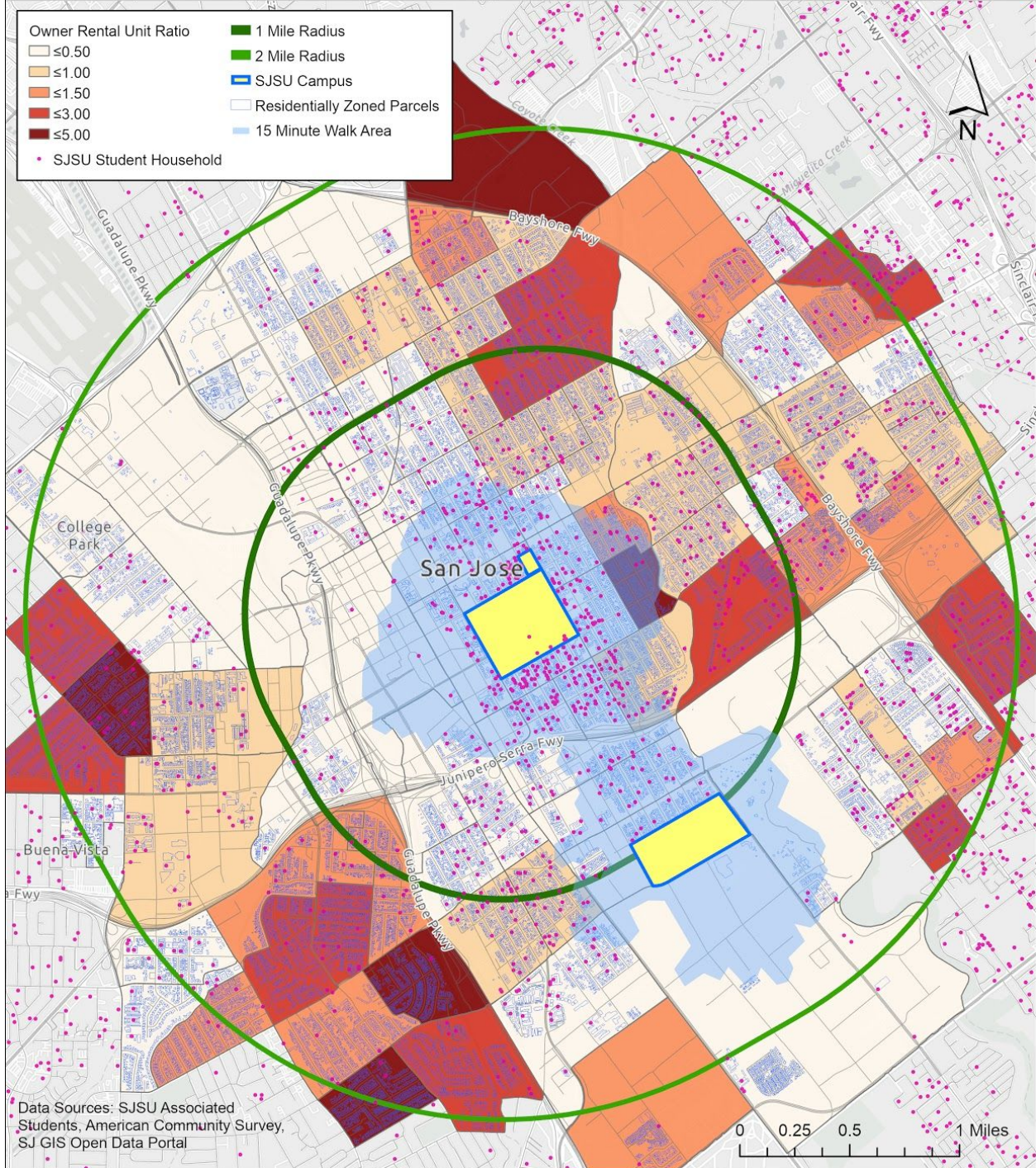
Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020



Owner/Renter Occupied Unit Ratio Surrounding SJSU

Authored by Kevin Lee, Kyle Wong, Lydon George, and Christopher Brady, Fall 2020.

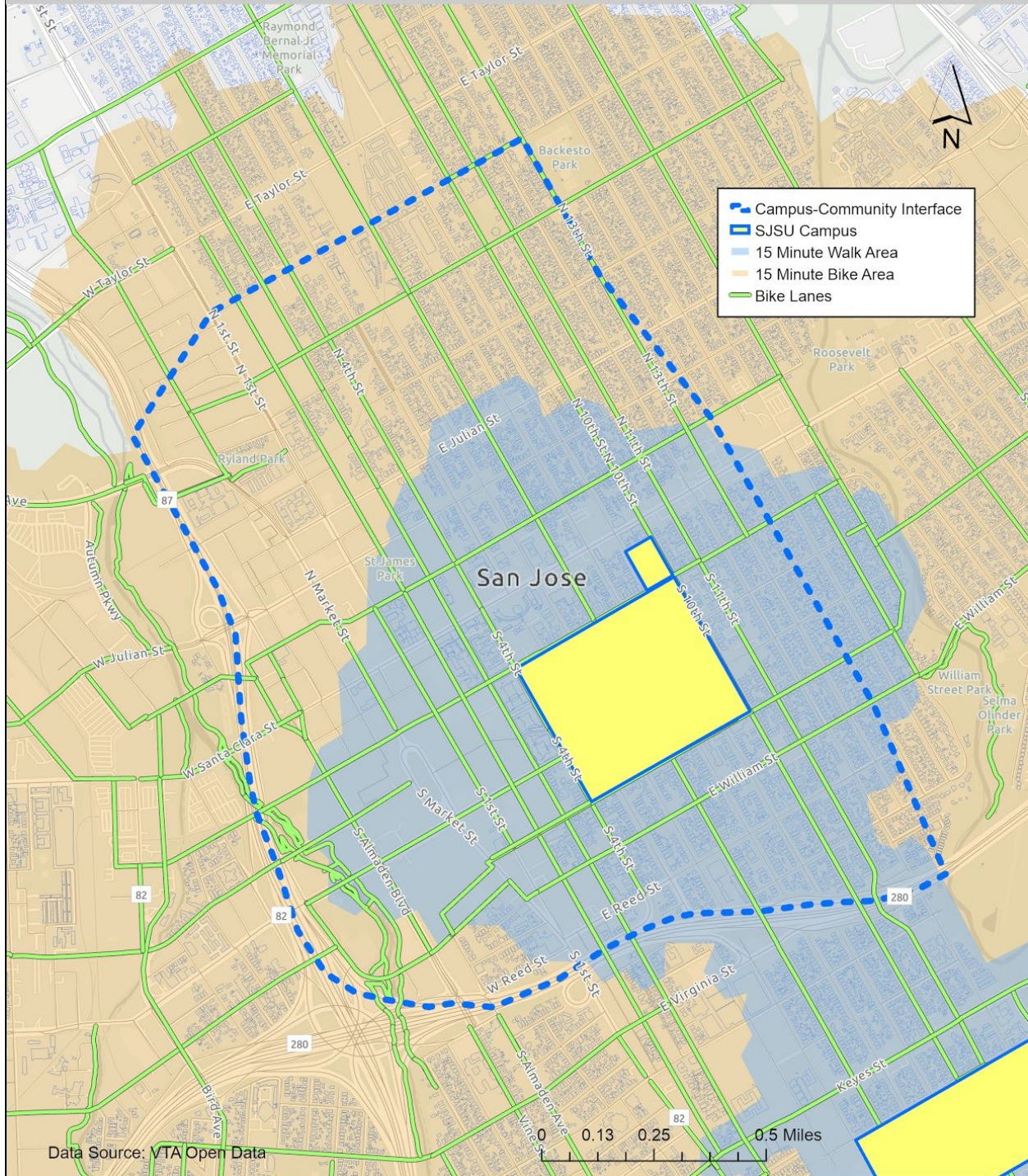
The ratio of owner occupied to renter occupied housing units by block group, within 1 and 2 miles of SJSU, provides insight as to where students are more likely to find housing near campus. Block groups with lower owner to renter ratios exist within 1 mile north and south of campus, and within a half mile west and east. The ratio increases outside of the 1 mile radius, suggesting that students will be less likely to find housing in these areas. SJSU should explore ways to increase housing opportunities near campus.



SJSU Campus-Community Interface

Authored by Kevin Lee, Kyle Wong, Lydon George, & Christopher Brady, Fall 2020

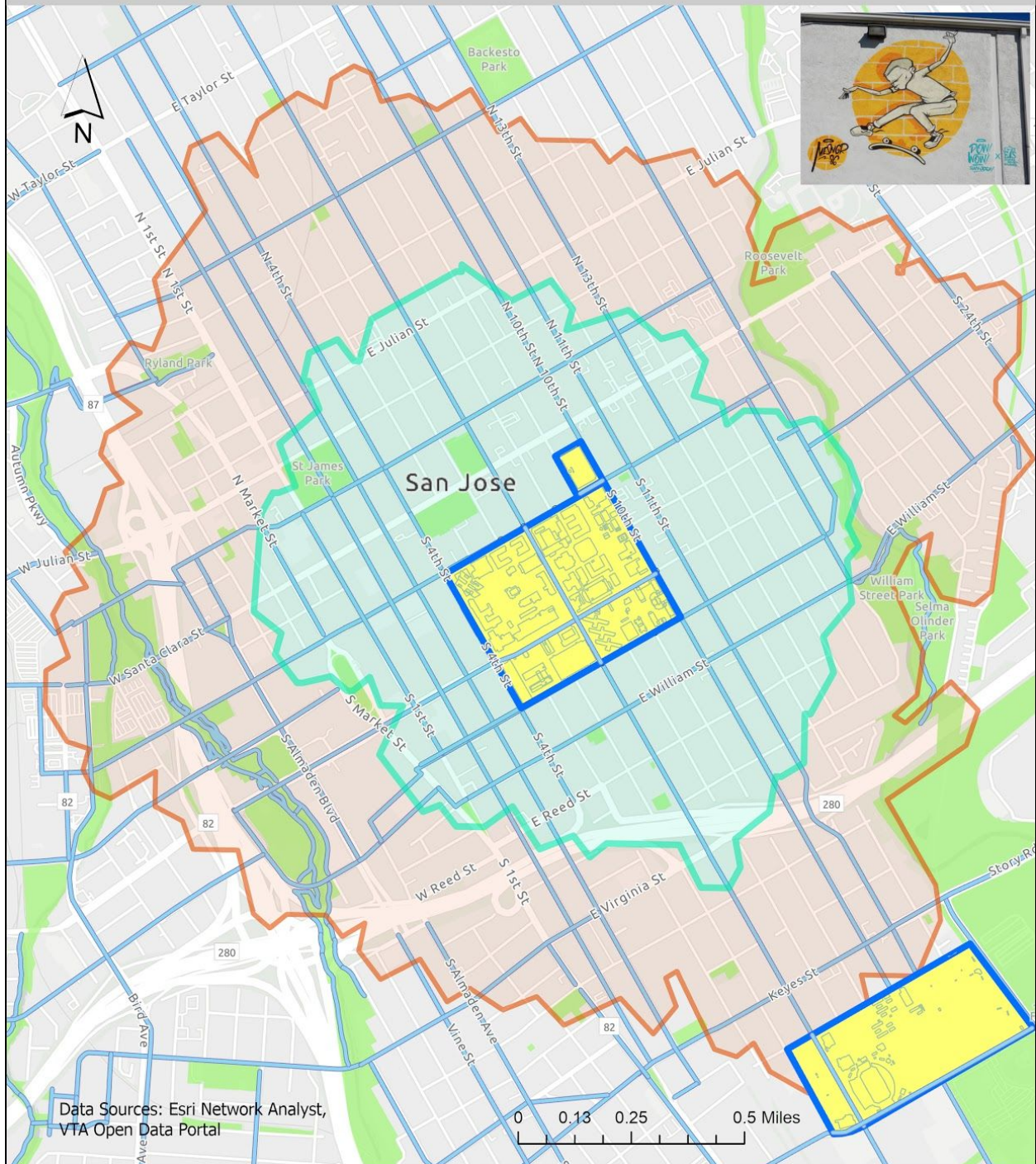
Where campus life and community life interact and integrate is known as the campus community interface. This area is determined by assessing access to and utilization of housing, mobility, and local services. Japantown, Downtown, Naglee Park, and South of Campus neighborhoods fall within the campus-community interface.



Skateboarding to SJSU - 5 and 10 Minute Skate-Sheds

By Kevin Lee, Kyle Wong, Lydon George, and Christopher Brady. Fall 2020

As Downtown San Jose sits flat in the bottom of the Santa Clara Valley basin, with well paved streets and a solid network of bike lanes, the area provides the perfect environment for SJSU's skateboarding culture to thrive. From the Main Campus, a 10 minute skate trip can take you to Japantown, East San Jose, Keyes/South Campus, and The Alameda neighborhoods.



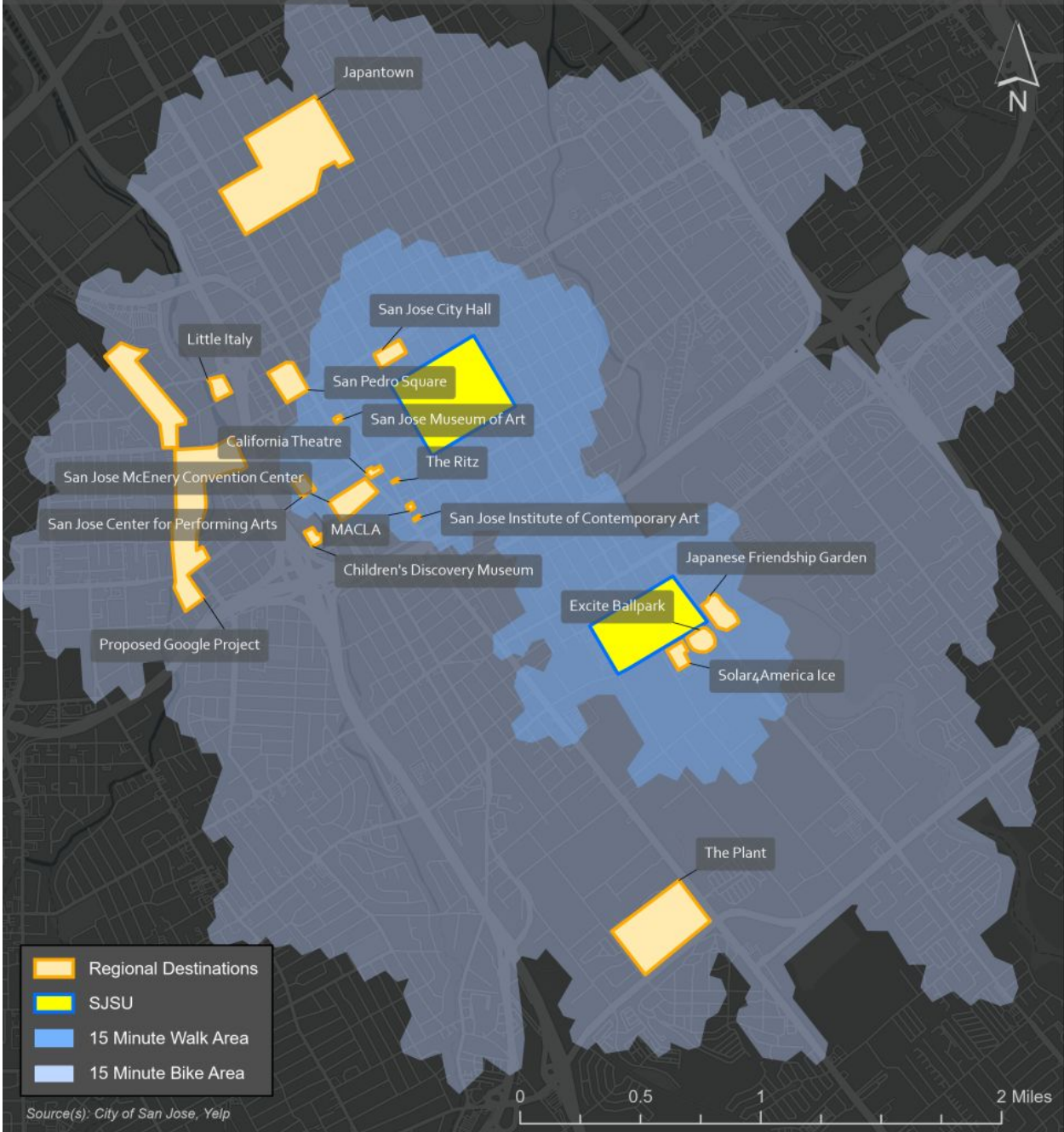
San Jose Community Destinations - Regional Draws

Authored by Kevin Lee, Kyle Wong, Lydon George and Christopher Brady, Fall 2020

San Jose State University is surrounded by a community rich with restaurants, cultural centers, gyms, and groceries to provide for students and residents alike. This map shows a general overview of the regional draws and their proximity to the university campus.

Travel areas were generated using ESRI's Network Analyst and are based on travelling for 15 minutes from the center of either campus (Walking Speed: 3 mph, Biking Speed: 10 mph).

An interactive Community Destinations map can be found at: <https://arcg.is/1GbWeH1>



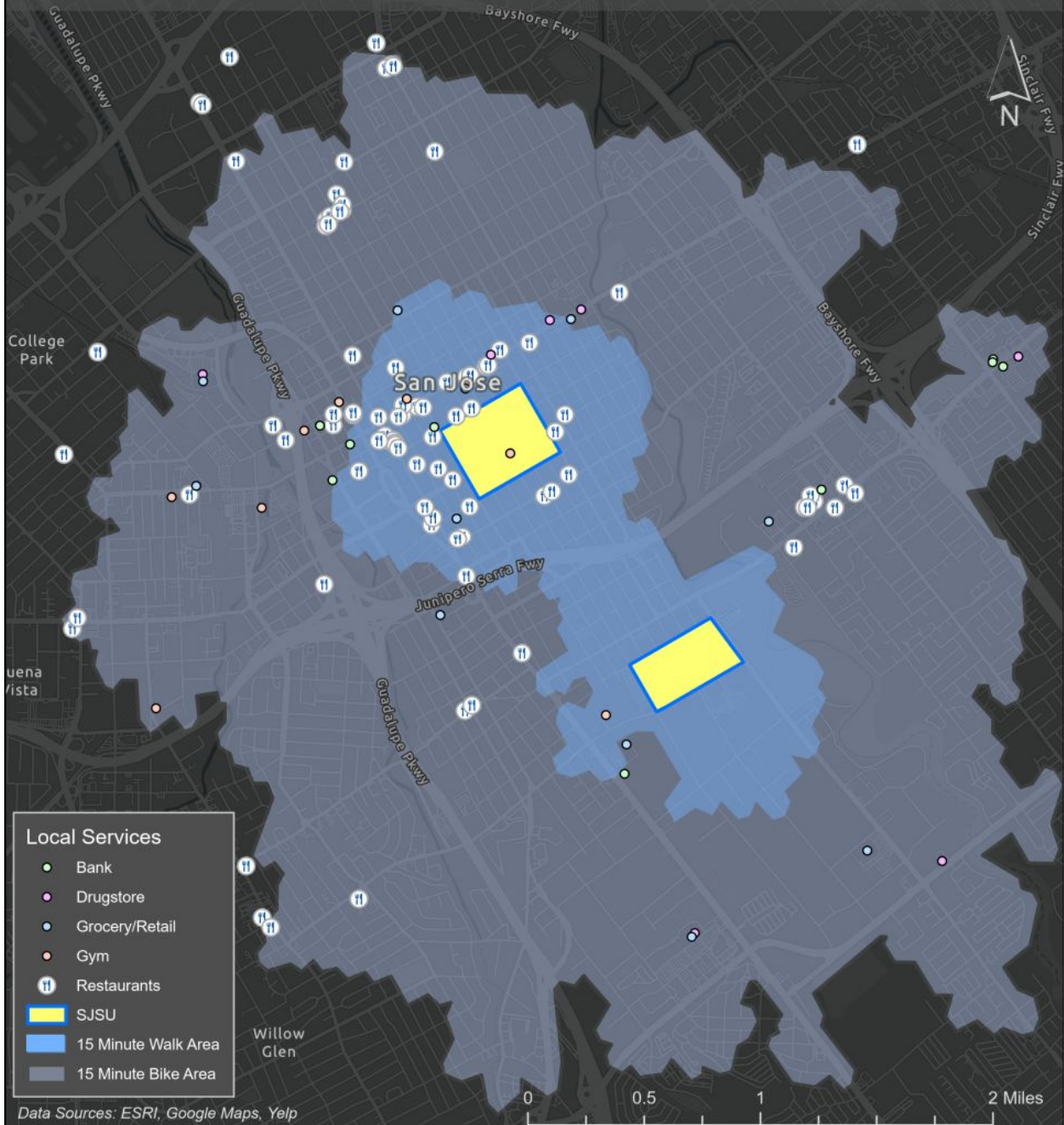
San Jose Community Destinations - Local Services

Authored by Kevin Lee, Kyle Wong, Lydon George and Christopher Brady, Fall 2020

San Jose State University is surrounded by a community rich with restaurants, cultural centers, gyms, and groceries to provide for students and residents alike. This map shows the local services and restaurants surrounding campus and their proximity to the university.

Travel areas were generated using ESRI's Network Analyst and are based on travelling for 15 minutes from the center of either campus (Walking Speed: 3 mph, Biking Speed: 10 mph).

An interactive Community Destinations map can be found at: <https://arcg.is/1GbWeH1>



San Jose State University Local Micro-mobility

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

Micro-mobility refers to the usage of small-scale transportation devices such as bicycles, scooters, and mopeds which provides a greater capacity to travel compared to walking. A preliminary analysis shows that utilizing micro-mobility in lieu of walking increases the total travel area by roughly 450%.

This map presents the potential of utilizing micro-mobility to access major transit services such as BART, VTA Light Rail, and the bus network.

Travel areas outlined below are based on 15 minute travel times from the center of San Jose State University's main and south campus at a walk speed of ~3 miles per hour and a bike speed of ~10 miles per hour.



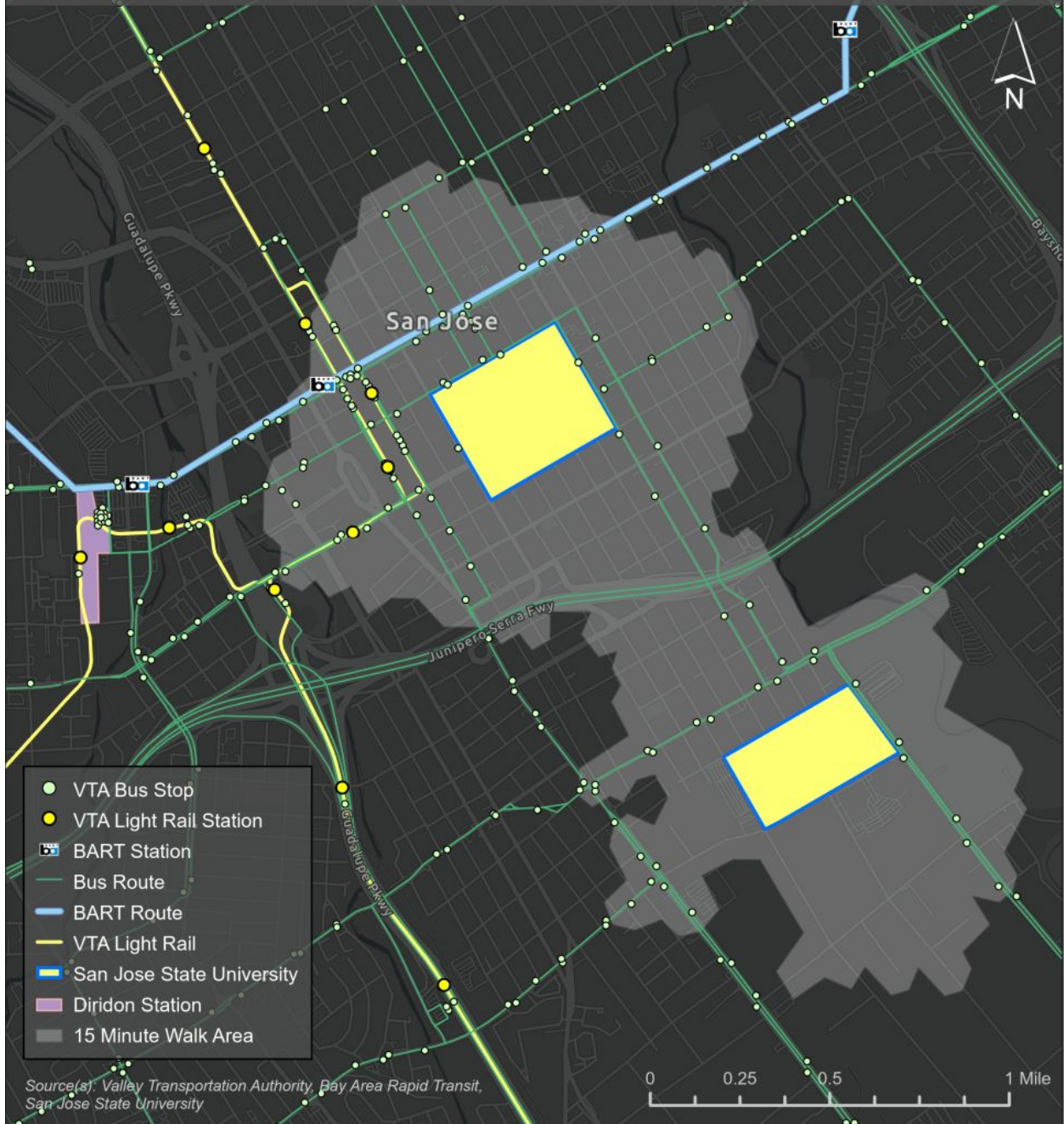
Local Transportation Network

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map provides a general overview of the public transit connectivity between San Jose State University and the surrounding community. The walk area is based on a 15 minute travel distance when walking at ~3 miles per hour.

80 bus stops and 3 light rail stations are accessible within a 15 minute walk from the main SJSU campus. The Downtown San Jose BART station will also be accessible within this walk area.

20 bus stops are accessible within a 15 minute walk from the south campus. No other transit operator services the area.



San Jose State University 3D Visualization

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

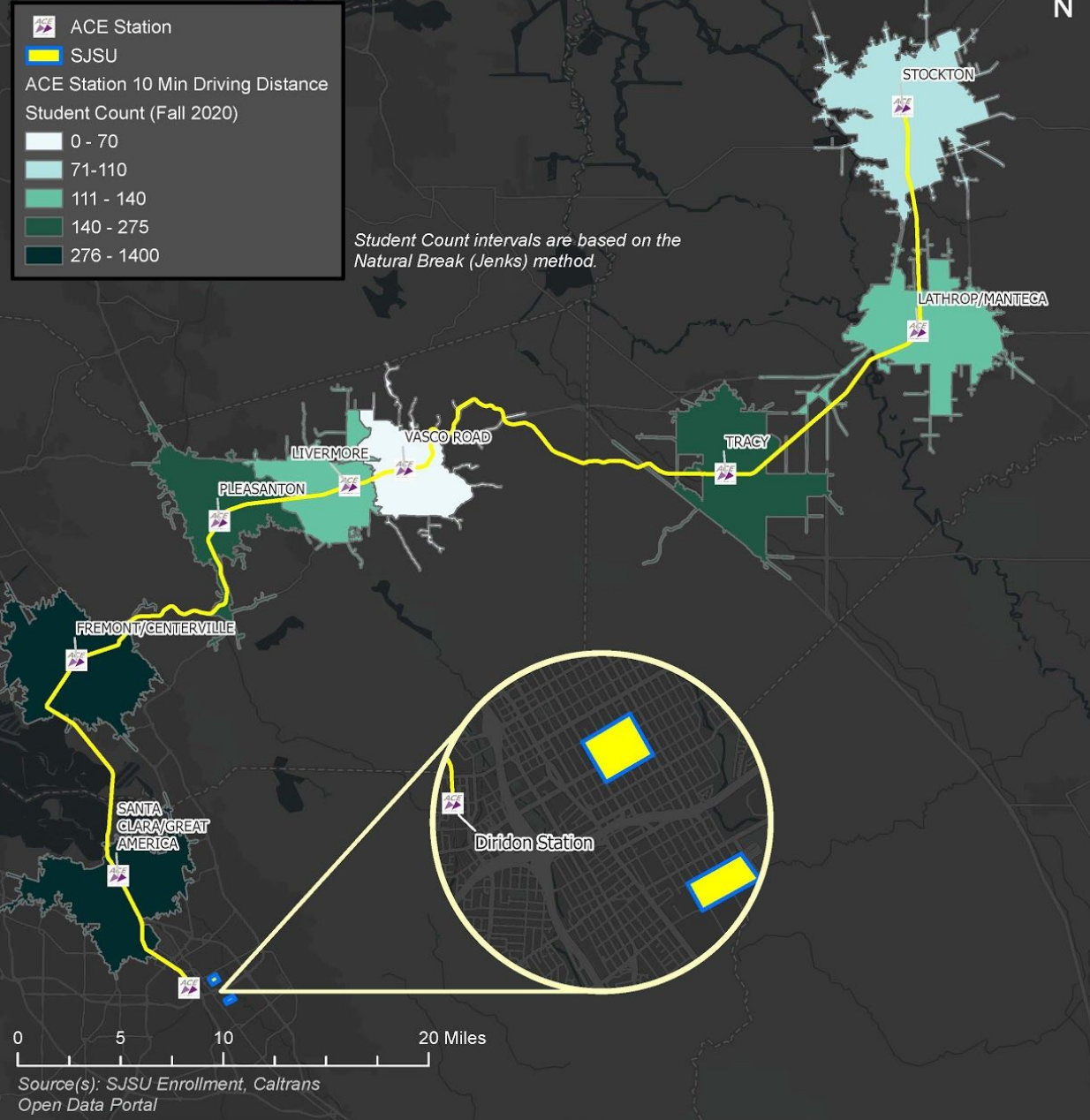


ACE Stations: Ten Minute Driving Distance Areas and Student Counts (Fall 2020)

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map shows areas within a 10 minute driving distance from a ACE Train station. The color scheme is based on the number of enrolled SJSU students located within the service areas. Student addresses are self reported upon enrollment and are voluntarily updated through their student portal. The total number of students within the distance areas are 3,387.

Service	Total Enrolled	Within Driving Distance	% of Total
ACE	35,836	3,387	9%

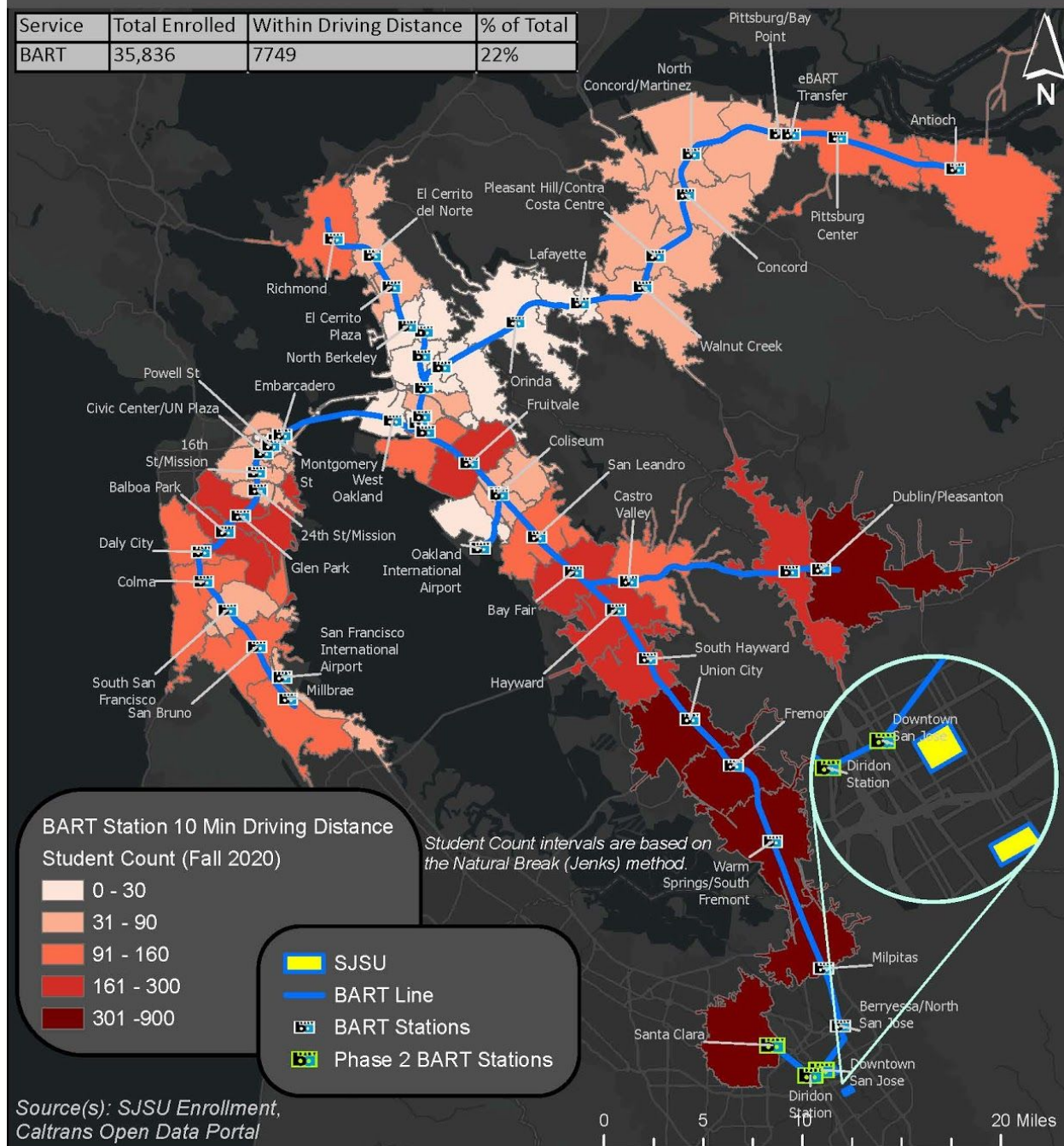


BART Stations: Ten Minute Driving Distance Areas and Student Counts (Fall 2020)

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map shows areas within a 10 minute driving distance from a BART station. The color scheme is based on the number of enrolled SJSU students located within the driving distance areas. Student addresses are self reported upon enrollment and are voluntarily updated through their student portal. This map does not include driving distance areas of stations within San Jose as VTA serves as the local transportation agency. The total number of students observed within these driving distance areas was 7,749.

Service	Total Enrolled	Within Driving Distance	% of Total
BART	35,836	7749	22%

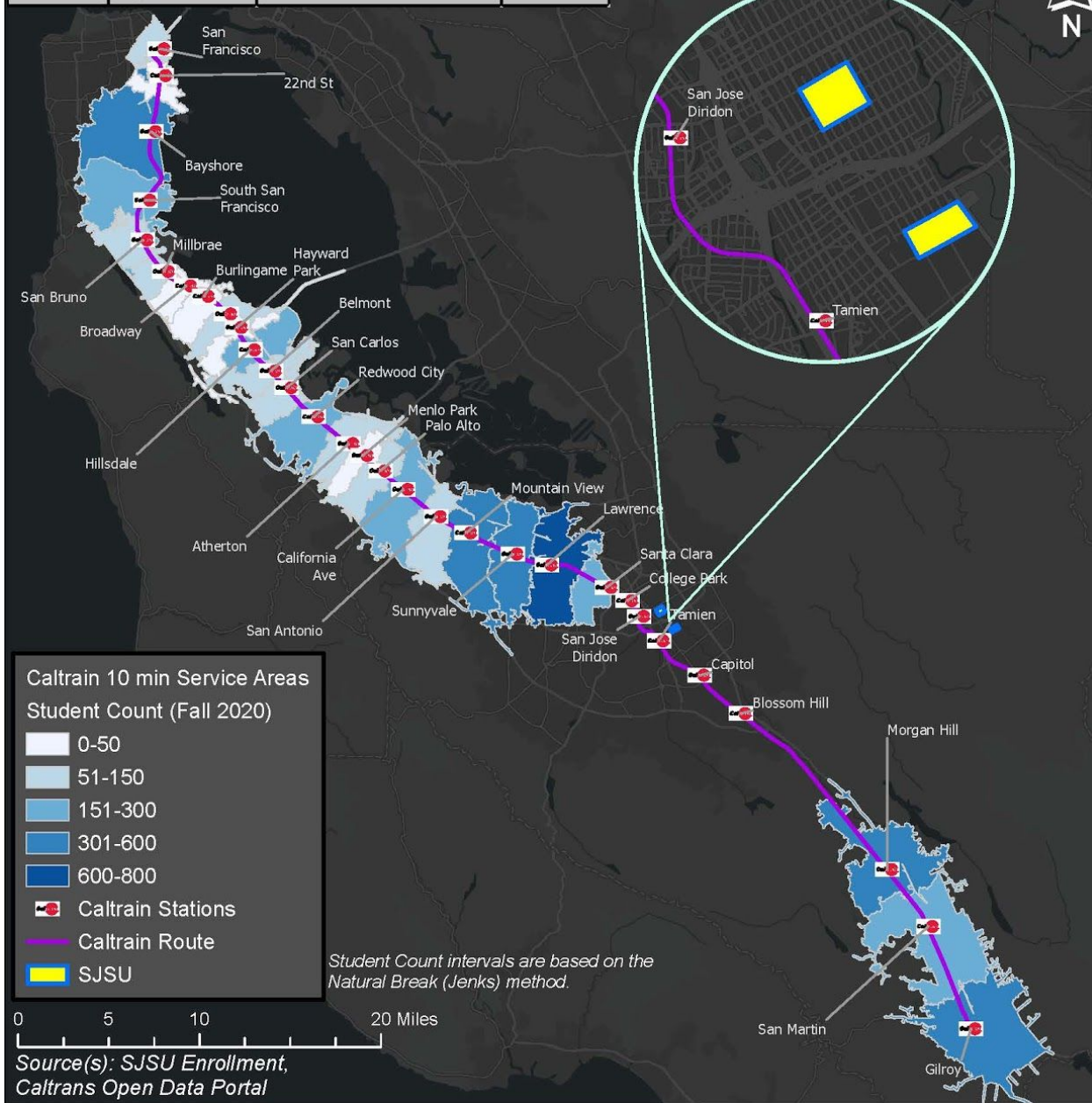


Caltrain Stations: 10 Minute Driving Distance and Student Counts (Fall 2020)

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map shows areas within a 10 minute driving distance from a Caltrain station. The color scheme is based on the number of enrolled SJSU students located within the driving distance areas. Student addresses are self reported upon enrollment and area voluntarily updated through their student portal. This map does not include the stations within San Jose since VTA serves the city locally. There were 4,912 students observed within these driving distance areas.

Service	Total Enrolled	Within Driving Distance	% of Total
Caltrain	35,836	4912	14%

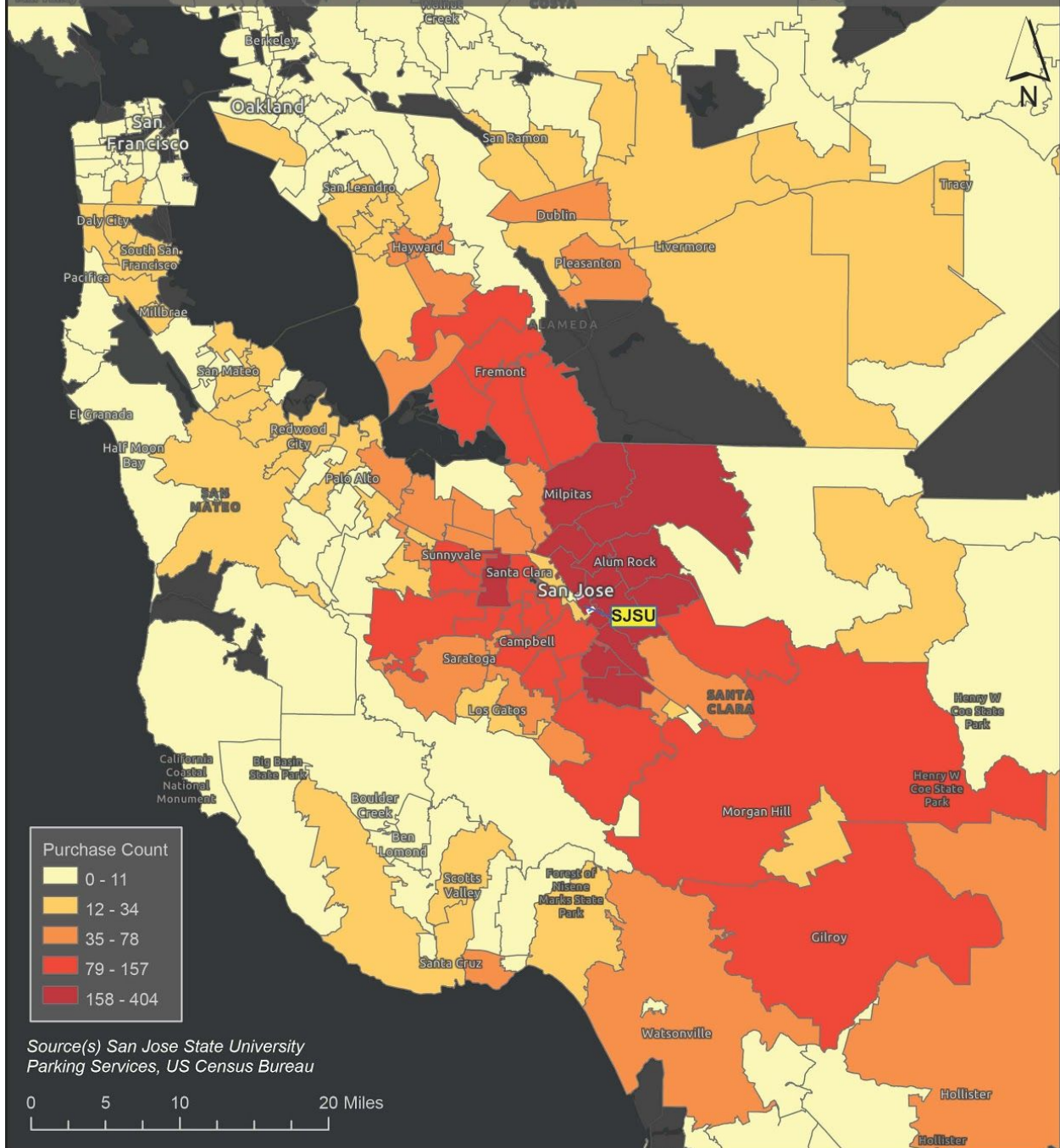


San Jose State University Parking Permit Purchases by Zip Code

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map displays the number of university parking permits based on the purchaser's zip code, representing the distribution of automobile commuters in the relevant communities around SJSU. Permits Sold intervals are based on the Natural Break (Jenks) method.

Parking permit data is based on purchases from August 2019 to December 2019.

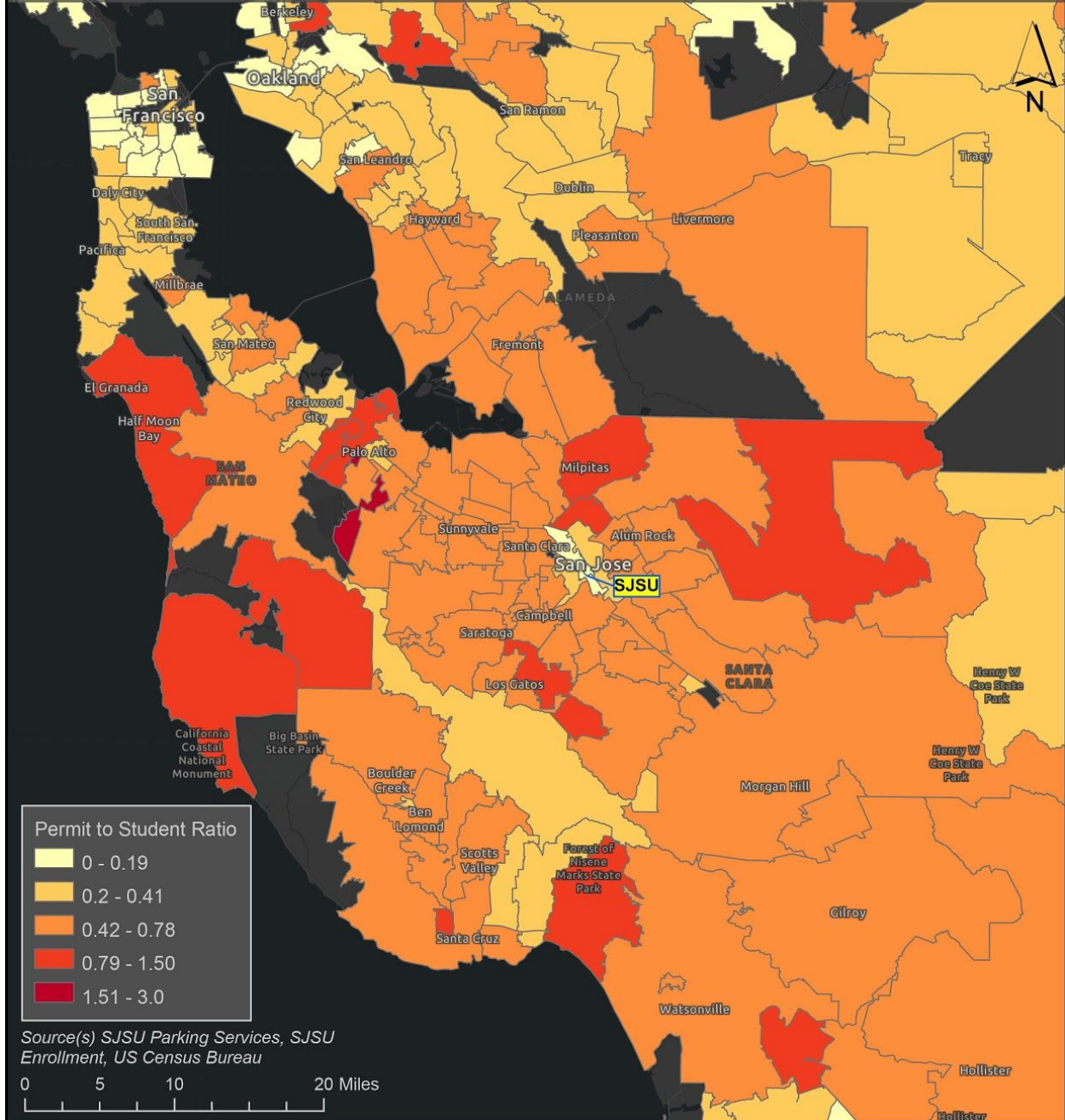


SJSU Parking Permit Purchases to Student Ratio by Zip Code

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map displays the ratio of purchased university parking permit count over student count within a zip code, representing the distribution of automobile commuters in the relevant communities around SJSU. Permits Sold intervals are based on the Natural Break (Jenks) method.

Parking permit data is based on purchases from August 2019 to December 2019. Student data is based on enrollment from Fall 2019.

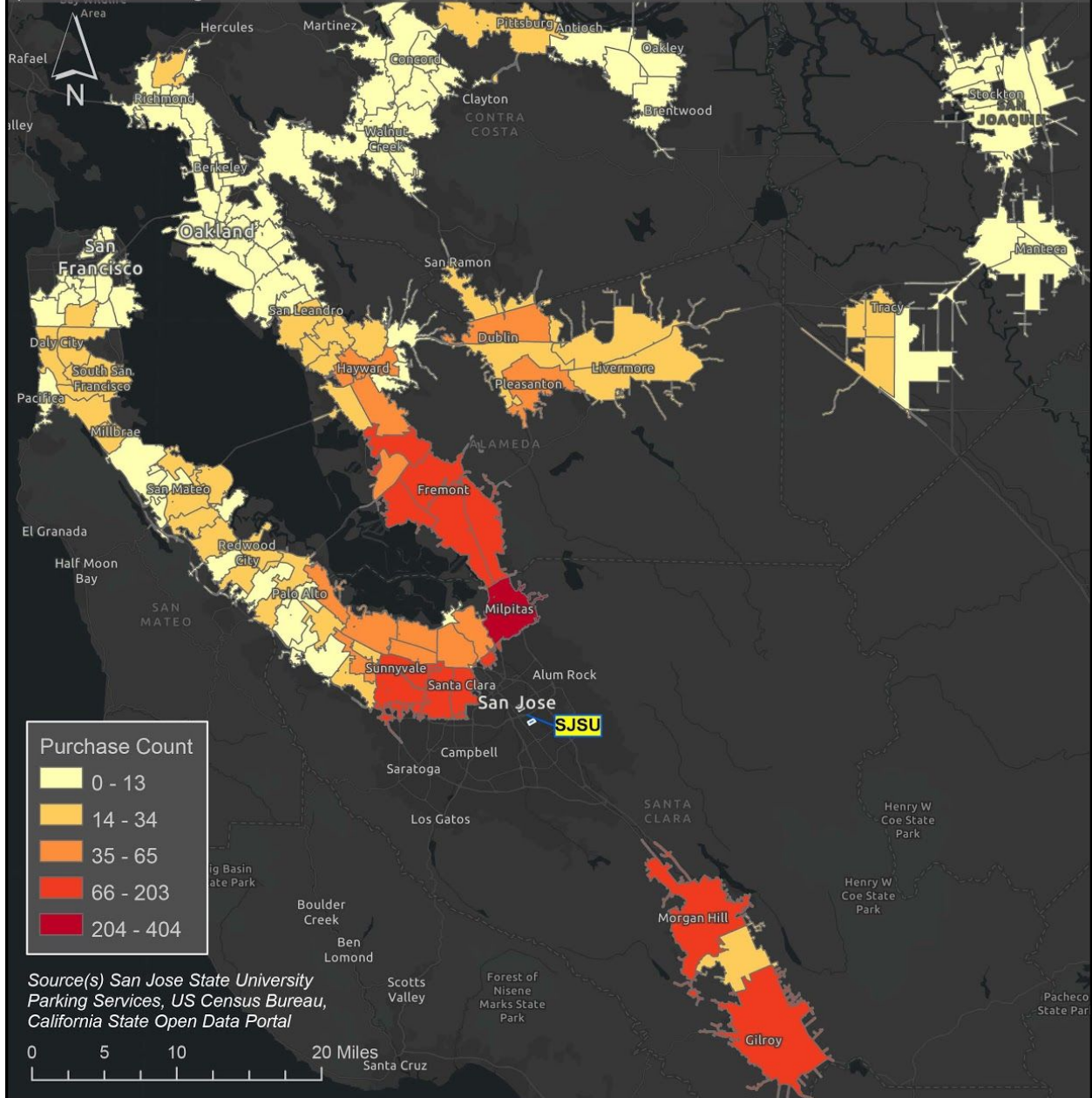


SJSU Parking Permits Near Regional Rail Service by Zip Code

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map displays the number of university parking permits based on the purchaser's zip code, generalizing the distribution of automobile commuters in the zip code areas within 10 minute driving distance to SJSU serving ACE, BART, and Caltrain stations. This information can better inform transportation demand management strategies in pursuit of SJSU sustainability goals.

Purchase Count intervals are based on Natural Breaks (Jenks) Method. Parking permit data is based on purchases from August 2019 to December 2019.

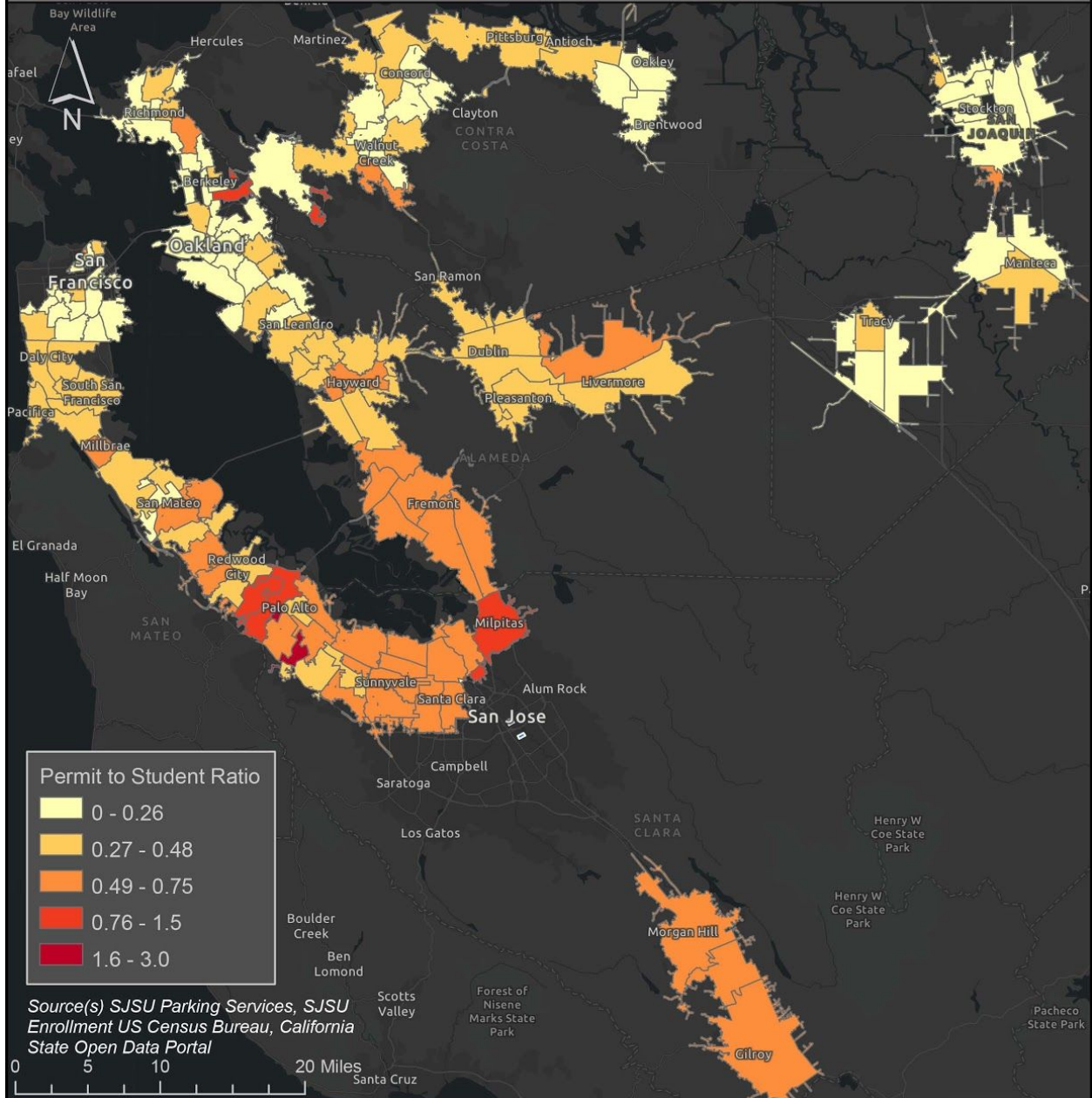


SJSU Parking Permit Purchases to Student Ratio Near Regional Rail Service

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map displays the number of university parking permits based on the purchaser's zip code and normalized by student count. This ratio generalizes the distribution of automobile commuters in the zip code areas within 10 minute drive distance to SJSU serving ACE, BART, and Caltrain stations. This information can better inform transportation demand management strategies in pursuit of SJSU's sustainability goals.

Permit to Student Ratio breaks are based on the Natural Breaks (Jenks) classification method. Parking Permit data is based on purchases from August 2019 to December 2019. Student counts is based on Fall 2019 enrollment data.

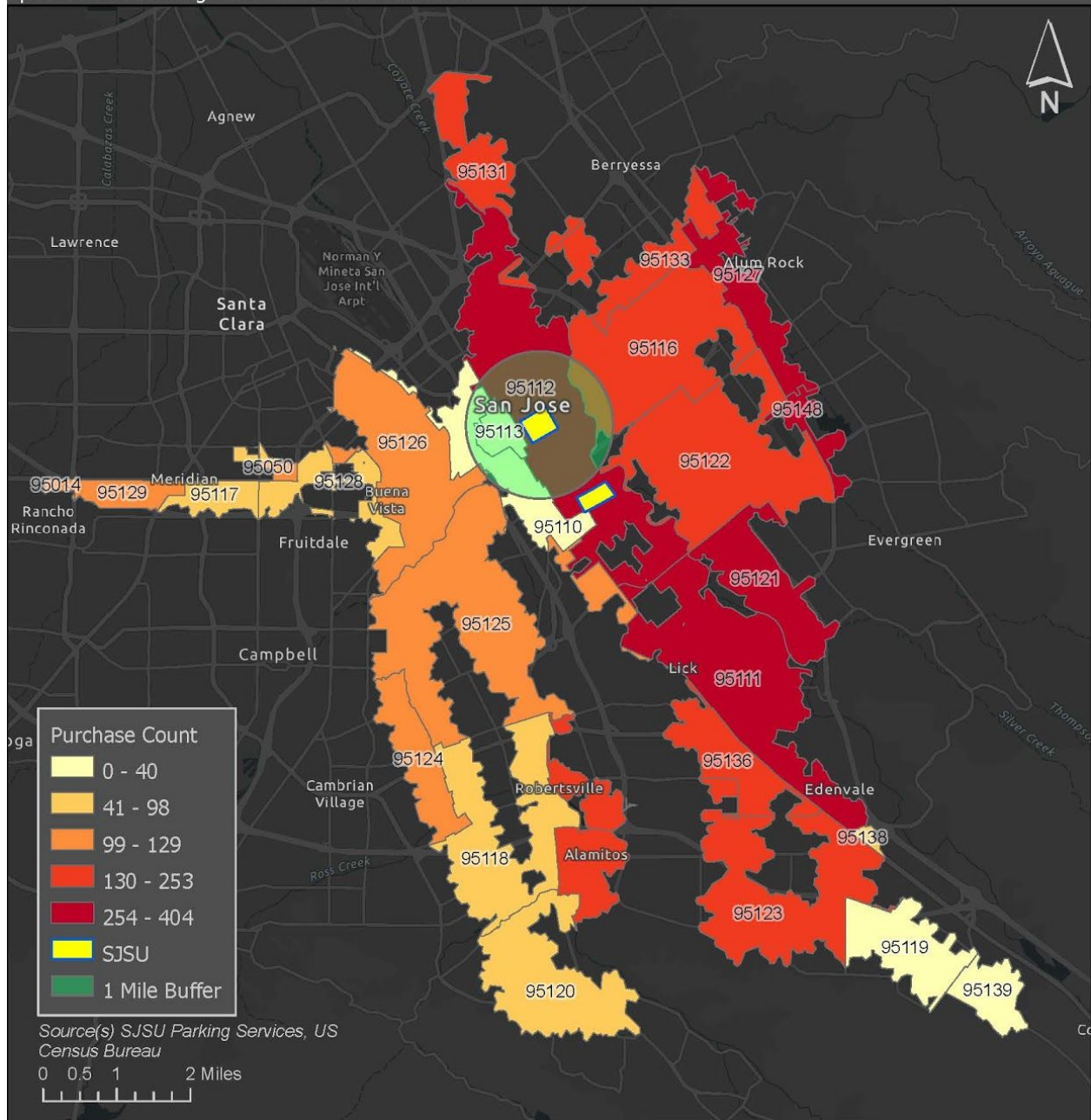


Parking Permit Data by Zip code and VTA Direct Lines to SJSU (Light Rail and Bus): 10 Minute Walking Distances

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map displays the number of parking permits purchased in Fall 2019 by zip code within a 10-minute walking distance of SJSU servicing VTA light rail stations and bus stops. The 10-minute walking distance area was created using all bus stops and stations belonging to VTA routes recommended by SJSU's Associated Students Transportation Solutions. Darker coloration denotes a number of parking permits sold.

Permits sold intervals are based on the Natural Breaks (Jenks) method. Parking permit data is based on purchases from August 2019 to December 2019.



Parking Permit Data over Student Count and VTA Direct Lines to SJSU (Light Rail and Bus): 10 Minute Walking Distances

Authored by Kevin Lee, Kyle Wong, Lydon George & Christopher Brady, Fall 2020

This map displays the ratio of parking permits purchased in Fall 2019 per student by zip code and within a 10-minute walking distance of SJSU servicing VTA light rail stations and bus stops. This ratio generalizes distribution of automobile commuters with VTA service. The 10-minute walking distance area was created using all bus stops and stations belonging to VTA routes recommended by SJSU's Associated Students Transportation Solutions. Darker coloration denotes a number of parking permits sold.

Permits sold intervals are based on the Natural Breaks (Jenks) method. Parking permit data is based on purchases from August 2019 to December 2019.

