



COMPREHENSIVE OPERATIONS ANALYSIS

MARKET ASSESSMENT

DECEMBER 2017





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1.

Introduction

The Napa Valley Transportation Authority (NVTA) has provided a wide variety of transit services to diverse communities throughout Napa County for the past eighteen years. Over this time period, the system has undergone incremental changes until December of 2012, when the system was completely reconfigured. Route alignment was changed but the way in which service was deployed did not. The service continued to be *coverage-based* and focused on providing service during traditional commute times and mid-day.

The alignment changes significantly boosted ridership for the Vine, but we live in a dynamic community and from time to time, service parameters need to be altered to keep pace with land use changes, demographic changes, and technological advancements. To address some of these changes, NVTA staff has begun a transit planning process called a *comprehensive operational analysis (COA)*. A COA reevaluates a transit system, looking towards the future using projections on ridership demand, geographic and demographic changes, and advances in technology.

Through the development of the Comprehensive Operations Analysis and public engagement, NVTA will be able to create a roadmap for deploying transit services over the next ten years.

The Market Assessment portion of the COA will inform the later planning process by analyzing the current and future market that the Vine serves. It will also build a profile for the current and untapped demand for transit in the County of Napa. Ultimately through the development of the COA and public engagement, NVTA will be able to create a plan for deploying transit services over the next ten years. The focus of this COA will be on routes serving the City of Napa and two of the regional routes serving the north-south corridor of the County. NVTA is conducting a separate Express Bus Study to evaluate its regional express bus services. The findings from the Express Bus study will also be incorporated into the final COA documents. Nevertheless, for the purpose of this Market Assessment, the focus of the documents will only be on Routes 1 – 8, 10, and 11. NVTA does operate four community shuttles. These shuttles will not be reviewed specifically in this document but will be studied further after the deployment of a new automated dispatch system. The new system will provide unprecedented data for NVTA, allowing in-depth analysis of trip patterns and levels of demand by time of day.

The analysis done in this document will allow NVTA staff to create a profile of residents' propensity to use transit, as well as create a transit demand index. Studying these elements will help isolate residential and employment densities that warrant the greatest need for transit and areas that have the greatest potential for greater transit use. The Market Assessment will be complemented by a Technical Assessment. The Technical Assessment will provide an evaluation of the current state of the system and offer insight into future system performance when strategic changes are applied.

Between the Market Assessment and the Technical Assessment five major questions should be answered: "How is transit performing today?", "Who is a typical transit rider?", "Where do typical transit riders live?", "Where are current transit riders coming from and going to?", and "What areas inside and outside the County are most supportive of transit".



Ultimately this Document will Answer Five Major Questions:

QUESTION 1:

How is transit performing today?

QUESTION 2:

Who is a typical transit rider?

QUESTION 3:

Where do typical transit riders live?

QUESTION 4:

Where are current transit riders coming from and going to?

QUESTION 5:

What areas inside and outside the County are most supportive of transit?

2.

Community Profile

Napa County is the smallest of the nine Bay Area Counties with a total population of roughly 143,000 people. The County has two urbanized areas, the City of Napa and the City of American Canyon. The City of Calistoga, the City of St. Helena, and the Town of Yountville are cities within the County of Napa but are classified as non-urbanized areas. These population centers are aligned along the Highway 29 corridor which provides north-south access across the entire county. Napa's wine and burgeoning hospitality industries are a driving force behind the County's economy. These industries bring people into the county for both work and pleasure.

Napa is not only the most rural county in the Bay Area, it has the second oldest population of the nine Bay Area counties with 15% of its residents being 65 years of age or older. With the exception of the historic neighborhoods within the cities and town, street and land use patterns are post-war developments that cater to the automobile. Consequently, the County of Napa provides many unique challenges in delivering efficient transit service. However, with these challenges opportunities exist to move people in, out of, and around the County in a more effective manner.

15% of Napa County Residents are Seniors

This is the **2nd** Largest Senior Population in the **9** Bay Area Counties



2.1 POPULATION AND EMPLOYMENT

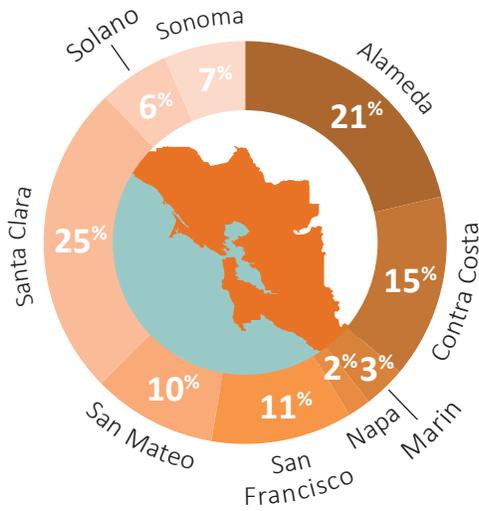
Average population density within the County is 170 people per square mile. The following sections will provide demographic information about the incorporated areas of the County.

2.1.1 The City of Napa

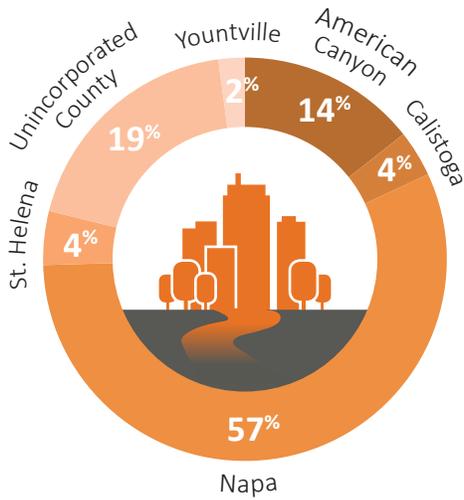
The City of Napa averages 4,200 people per square mile with a maximum of around 11,000 people. The population in the City of Napa is spread out in multiple neighborhoods. Typical to suburban land use patterns there are very few locations of high residential densities. *Figure 2-1* shows the highest population densities forming a “cross” pattern that follows the major arterials bisecting the city at all four points on the compass. Lower density areas tend to be on the outer ring of the City typical of suburban land use. Higher employment densities are concentrated in pockets and are primarily located around the central downtown area and the northern part of the City along the Trancas and Jefferson Corridors. *Figure 2-2* also shows a higher density pocket in south Napa which is primarily driven by large shopping centers (South Napa Market Place and the South Napa Century Center) located within that census tract.

There is usually a direct correlation between areas of high population and employment densities and the vitality of transit services. Looking outside of downtown the only other areas of relatively high population and employment densities are along the Trancas corridor and in the neighborhood directly east of the South Napa Marketplace. Outside of those two areas, high population and job density are separated. This separation makes route alignment a difficult task, as people living in one area of the City may not be working in the closest area of high employment density.

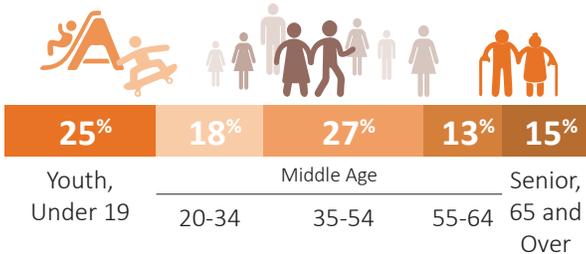
Total Population By County (for 9 Bay Area Counties)



Napa County Population Distribution

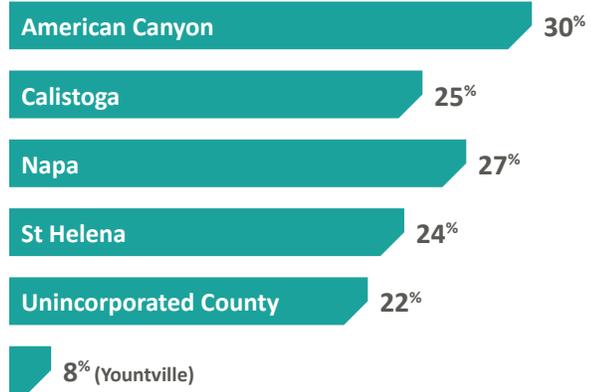


Population by Age, Countywide, Napa (Youth, Seniors, Middle Age)



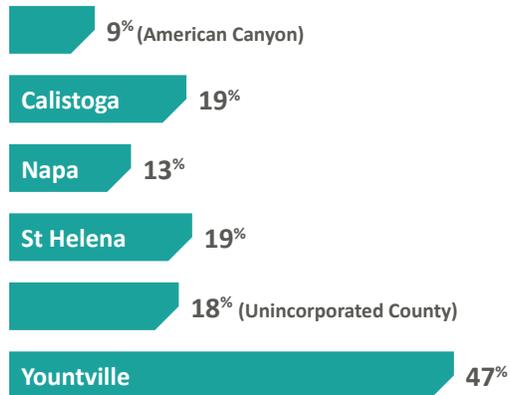
YOUTH POPULATION

Percent Population Under Age of 19 by City



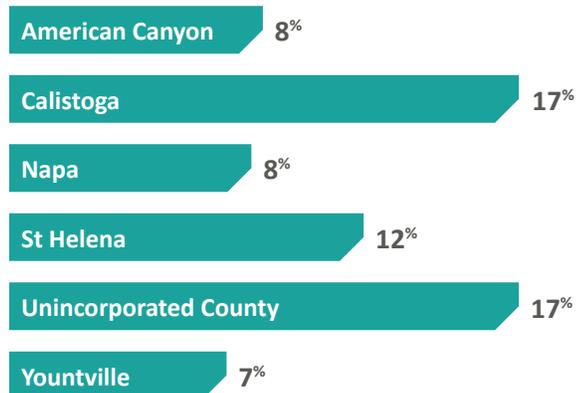
SENIOR POPULATION

Percent Population 65+ by City



POVERTY

Percent Population in Poverty by City



* Poverty - Individuals at or below the nationwide poverty level at the time the data was collected.

2.1.2 The City of American Canyon

The City of American Canyon is primarily a suburban community with no central downtown or business district. Its highest concentration of residents is around 10,000 people per square mile as seen in *Figure 2-3* however the average is much lower at around 4,000. Job density in American Canyon is low relative to other urbanized areas, with the highest density being around 1,000 jobs per square mile. The Safeway and the surrounding shopping center support the largest employment density as shown in *Figure 2-4*. The industrial areas around Airport Road, as well as the other shopping centers located along Highway 29 are also comparatively high employment centers.

2.1.3 Up Valley Communities

The Up Valley communities of Calistoga, St. Helena, and Yountville have relatively low population densities peaking around 3,400 people per square mile in Calistoga as seen in *Figure 2-5*. The low population density and compact city limits of these communities have allowed NVRTA to operate local door-to-door service as opposed to traditional fixed routes. Given the compact size of these communities the number of jobs is surprisingly high (*Figure 2-6*). These high employment densities are primarily driven by businesses oriented around wine tourism e.g. restaurants, hotels, bars, etc. The Town of Yountville is the one exception, where the Veteran's Home of America brings up the jobs per square mile considerably.

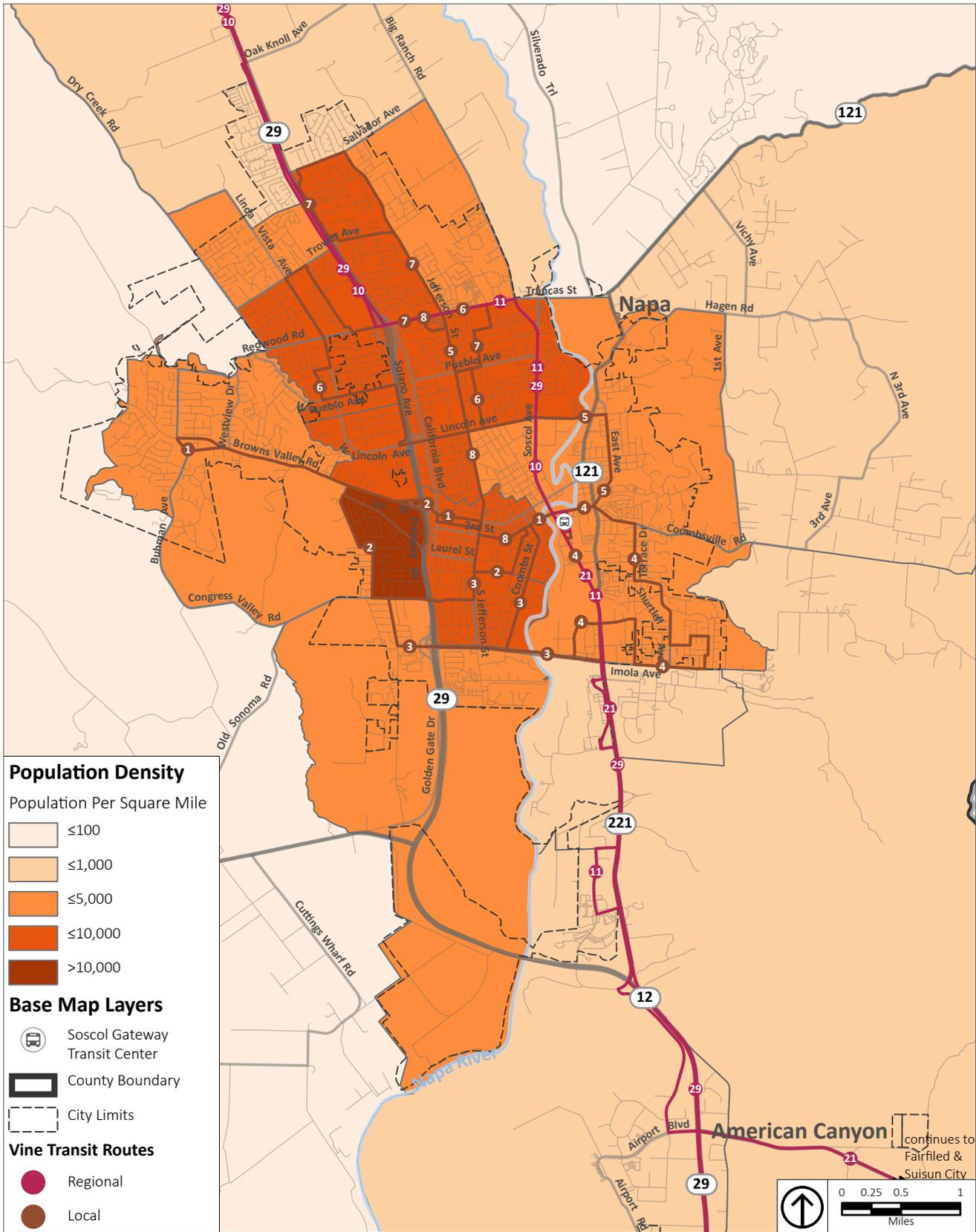


Figure 2-1: City of Napa Population Density

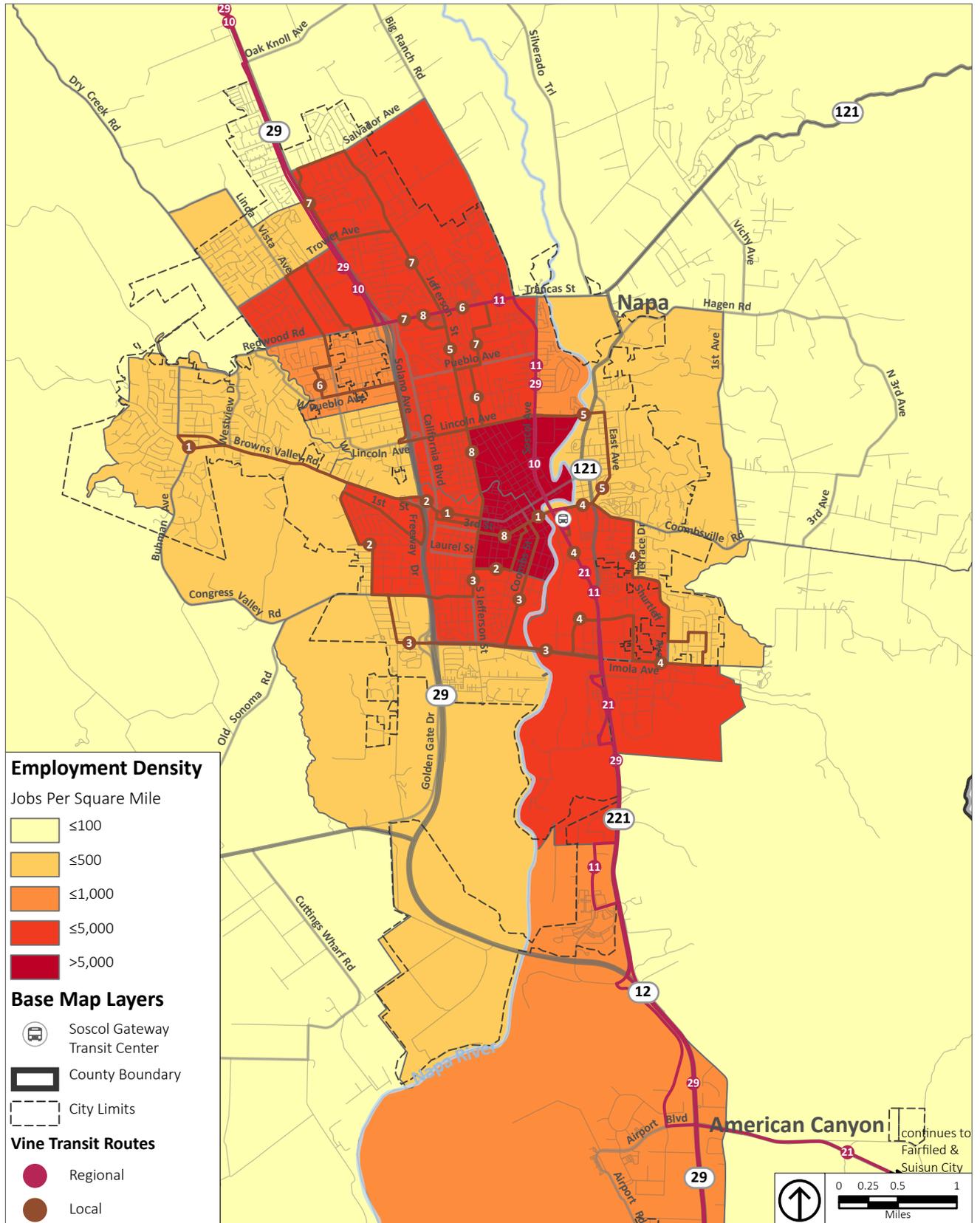


Figure 2-2: City of Napa Employment Density

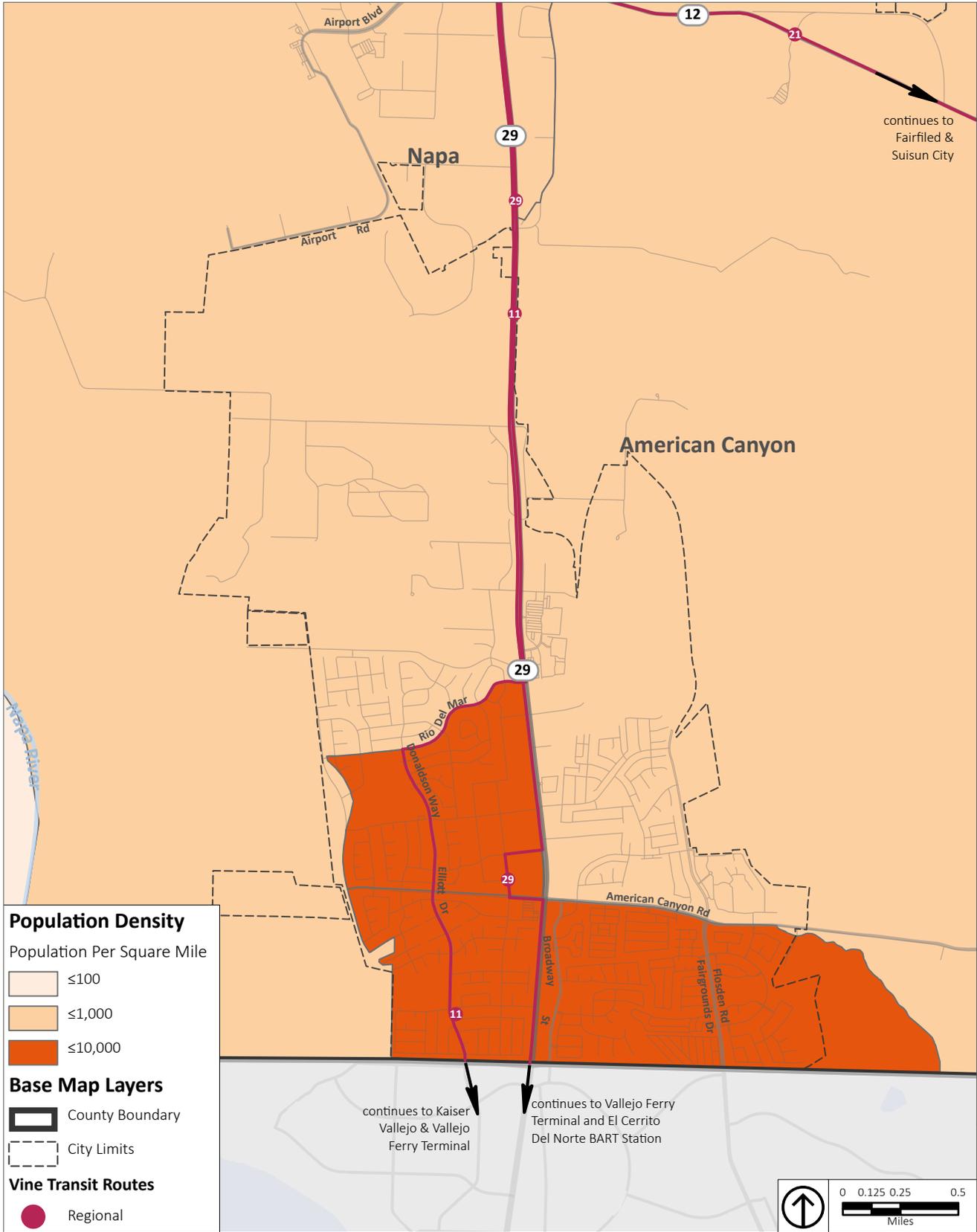


Figure 2-3: City of American Canyon Population Density

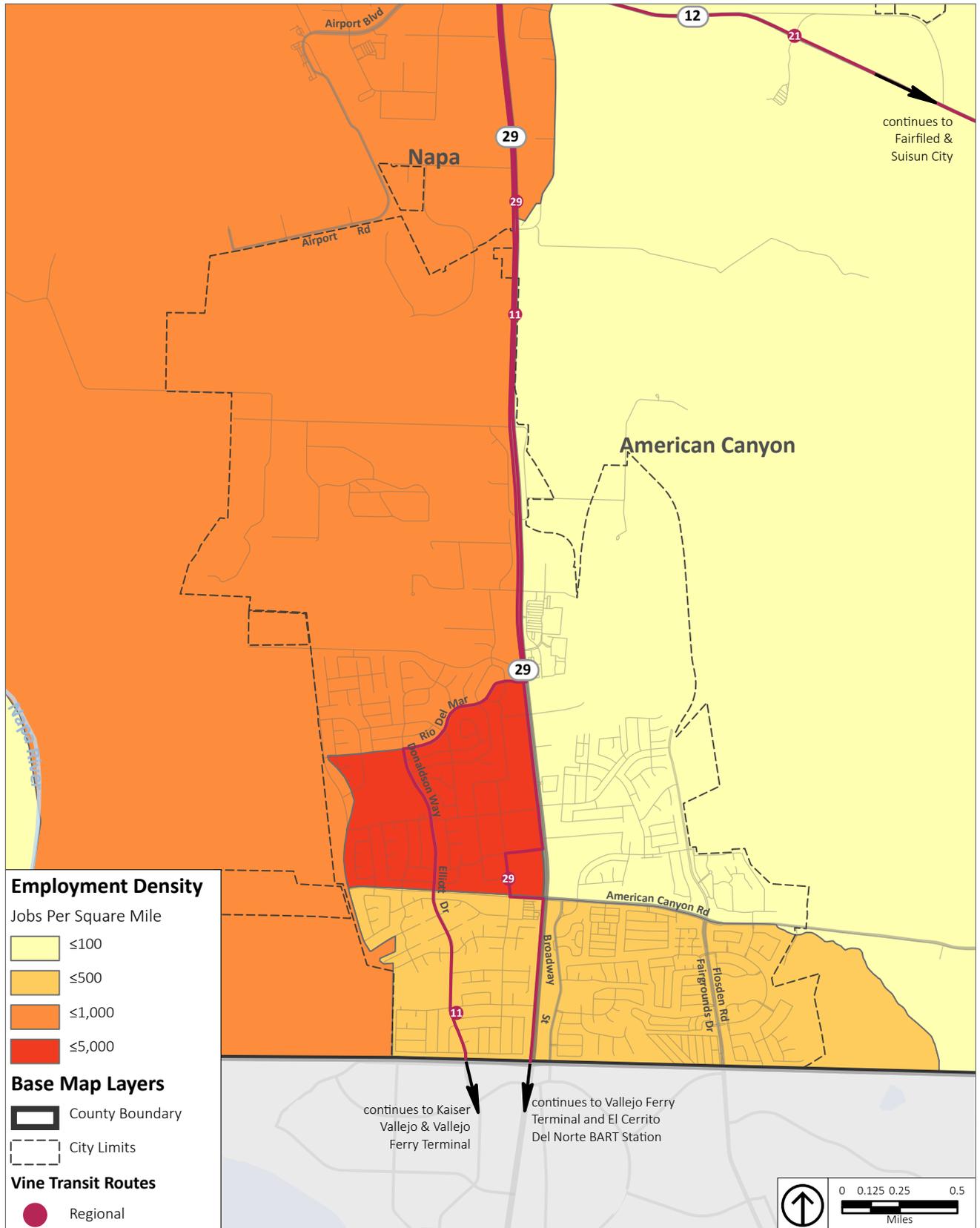


Figure 2-4: City of American Canyon Employment Density

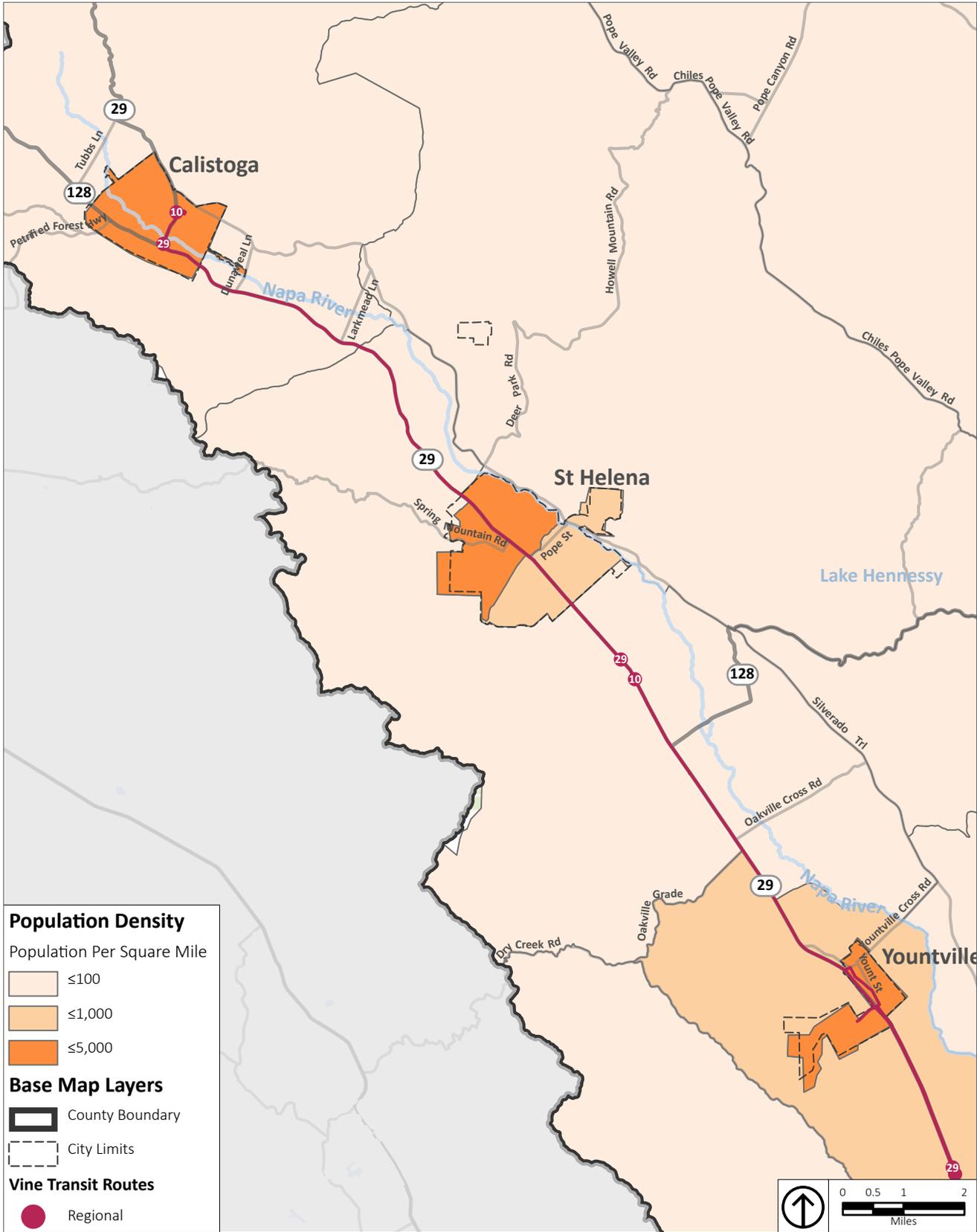


Figure 2-5: Up Valley Communities Population Density

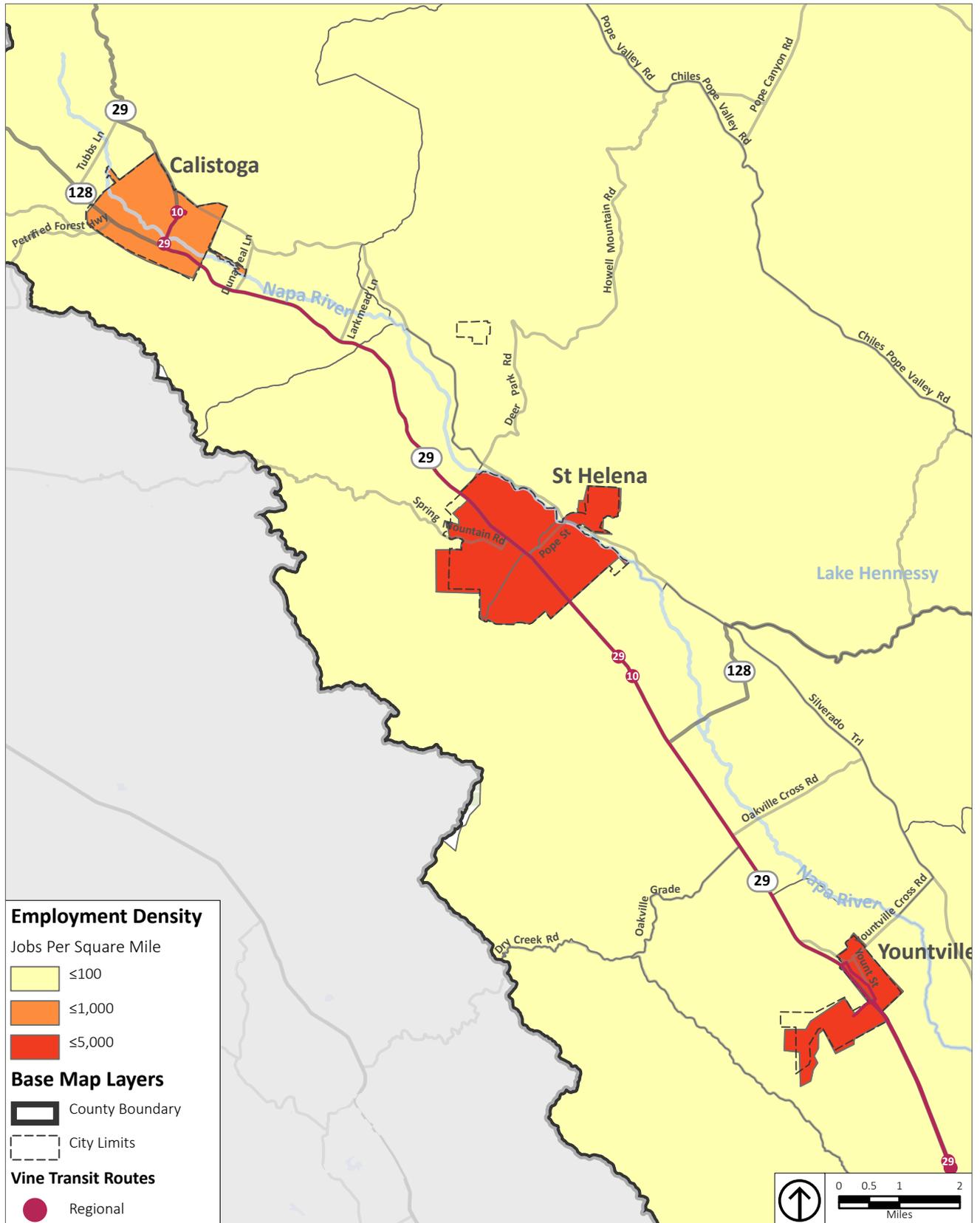


Figure 2-6: Up Valley Communities Employment Density



2.1.4 Unincorporated Areas

The unincorporated areas of Napa County are primarily rural open space and agriculture. The population is spread thinly in these areas with less than 500 people per square mile. The two exceptions being the unincorporated area east of the City of Napa and Angwin, a census designated place (CDP) located north east of the City of St. Helena. Employment densities in the unincorporated parts of Napa County are equally sparse. Pockets of high employment however do exist. Angwin has a higher concentration of jobs than other unincorporated areas due to Pacific Union College. St. Helena Hospital, another large employer in the unincorporated area, employs roughly 1,050 people. Silverado Resort located northeast of the City of Napa is another relatively large employer for the unincorporated area. A relatively higher concentration of jobs parallels Highways 121 and 29 between the Cities of Napa and American Canyon. These areas are primarily industrial jobs located on large lots posing a challenge to serve effectively with transit.

2.2 DEMOGRAPHIC OVERVIEW

Certain population segments have a higher propensity for transit use than others. Understanding where these populations live and work is critical to effectively deploy transit service. Certain factors are predictors for when somebody uses transit as a primary mode of transportation. To zero in on areas where there are high concentrations of transit users, we will evaluate the following demographics: seniors, youth, income level, vehicle ownership, and people with disabilities.

As stated previously, Napa County has the second oldest population of the nine county Bay Area. Individuals over 65 make up 15% of the County's population. The City of Napa has roughly the same percentage of adults 65 and older at 13.6%¹. *Figure 2-7* shows the density patterns of seniors within the City of Napa. The highest concentrations of seniors are primarily north of the downtown area. The high concentrations of seniors in these tracts are driven by the large senior living communities located in those areas.

Figure 2-8 shows a greater dispersal of youth populations than senior populations. Concentrations of youth populations do exist west of Highway 29 and east of Jefferson Street between Trancas and Lincoln.

Income level is a strong indicator of transit propensity. Higher earning individuals living in suburban areas are generally car owners with greater employment flexibility. The reverse is true for lower income populations living in the same area, and consequently this group tends to be more reliant on transit as an affordable form of transportation. *Figure 2-9* shows the concentrations of people living under the nationwide poverty level per square mile. In the City of Napa 11.7% of the population lives in poverty which exceeds the rest of the Bay Area as whole by

a full 2%². The highest concentrations of poverty are located in the eastern areas of the City with few moderately dense pockets of poverty scattered throughout the City. There is another predominantly low-income census tract south of Imola Avenue. Napa Valley College and Napa State Hospital are the two predominant land uses in the tract however do not have populations reflected in the census data. The perception that a large low income population lives in this area is skewed due to two low-income apartment complexes on Imola.

For the most part, the highest densities of car free households are in the same census tracts with the highest densities of seniors, youth, and those living in poverty. The one anomaly to this pattern is the high concentration of car free households in the downtown area (*Figure 2-10*). Higher concentrations of car free households may exist in the area due to parking constraints. The high concentration of car free households in Northeast Napa could be attributed to the numerous senior living facilities in the area.

Figure 2-11 shows the distribution of the population living with a disability. Based on 2011-2015 American Community Survey (ACS) data, 9.8%³ of the City of Napa's population reported having a disability. In the City of Napa the tracts with highest concentrations of disabled individuals are scattered. These concentrations line up with the highest concentrations for car free households. Depending on the degree of the disability, easier access to fixed route transit would increase mobility and potentially reduce reliance on ADA paratransit.

1 MTC. Bay Area Census. <http://www.bayareacensus.ca.gov/cities/Napa.htm>

2 MTC. Bay Area Census. <http://www.bayareacensus.ca.gov/bayarea.htm>

3 Disabilities that may not inhibit one's ability to drive a car are included in this data.

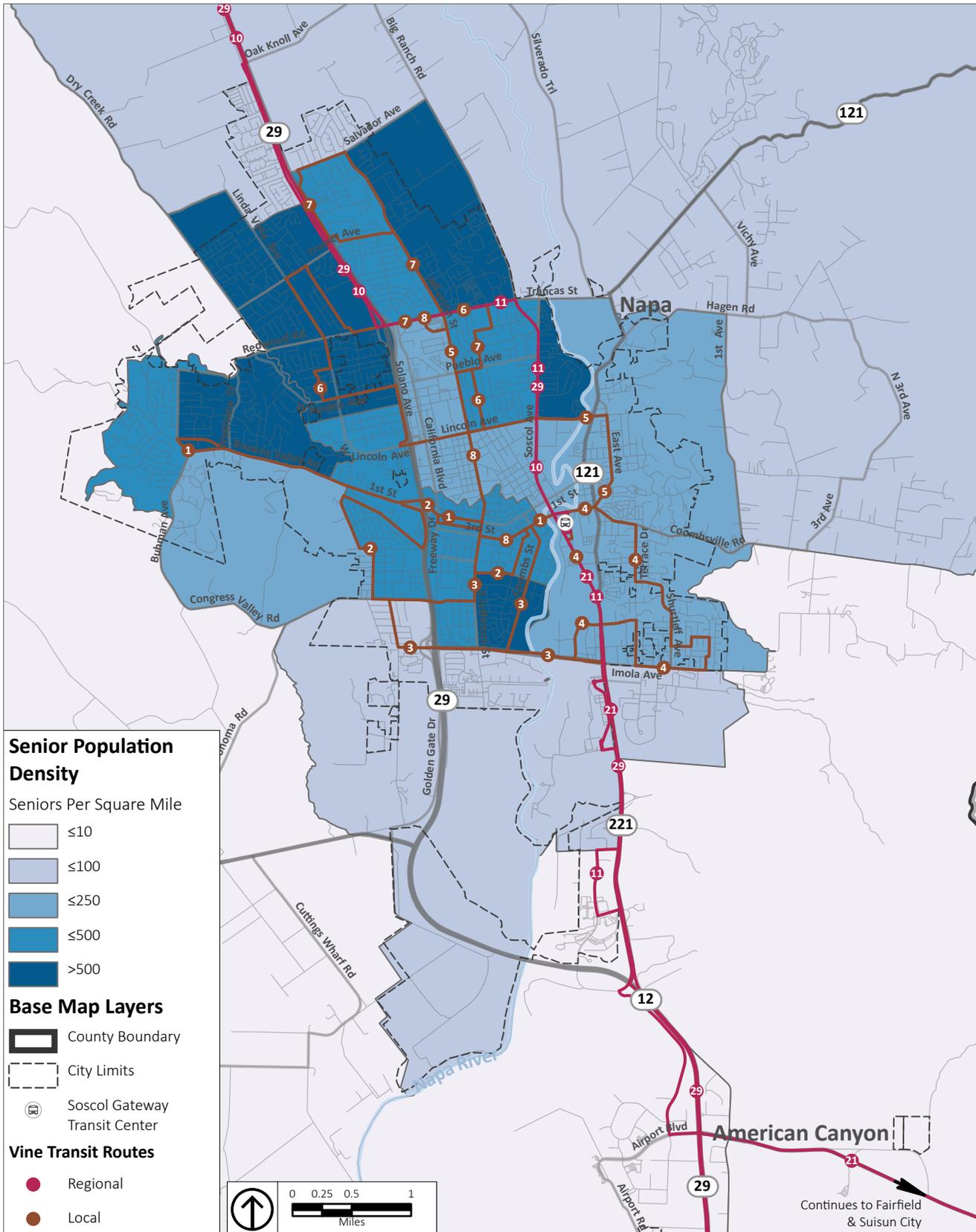


Figure 2-7: City of Napa Senior Population Density

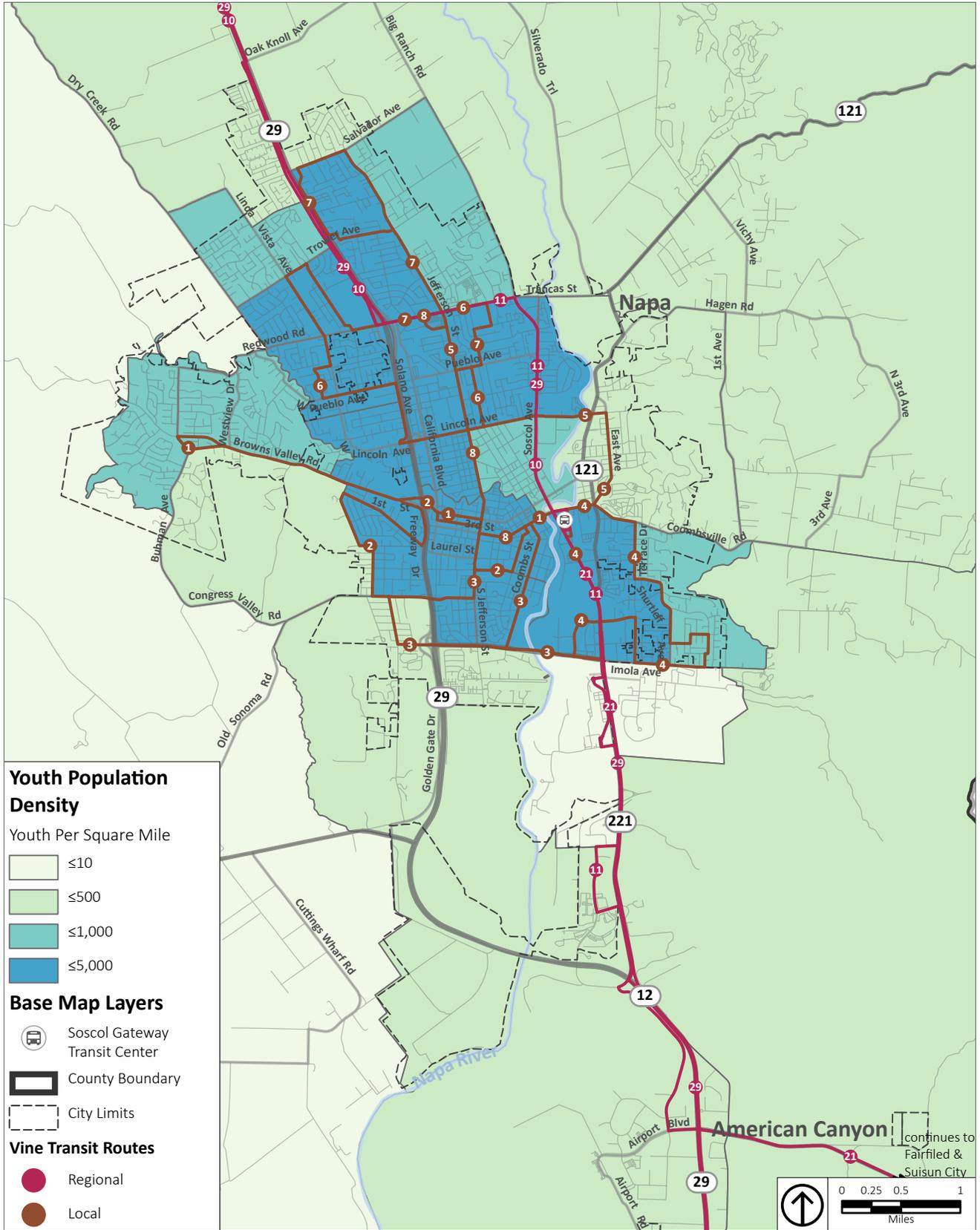


Figure 2-8: City of Napa Youth Population Density

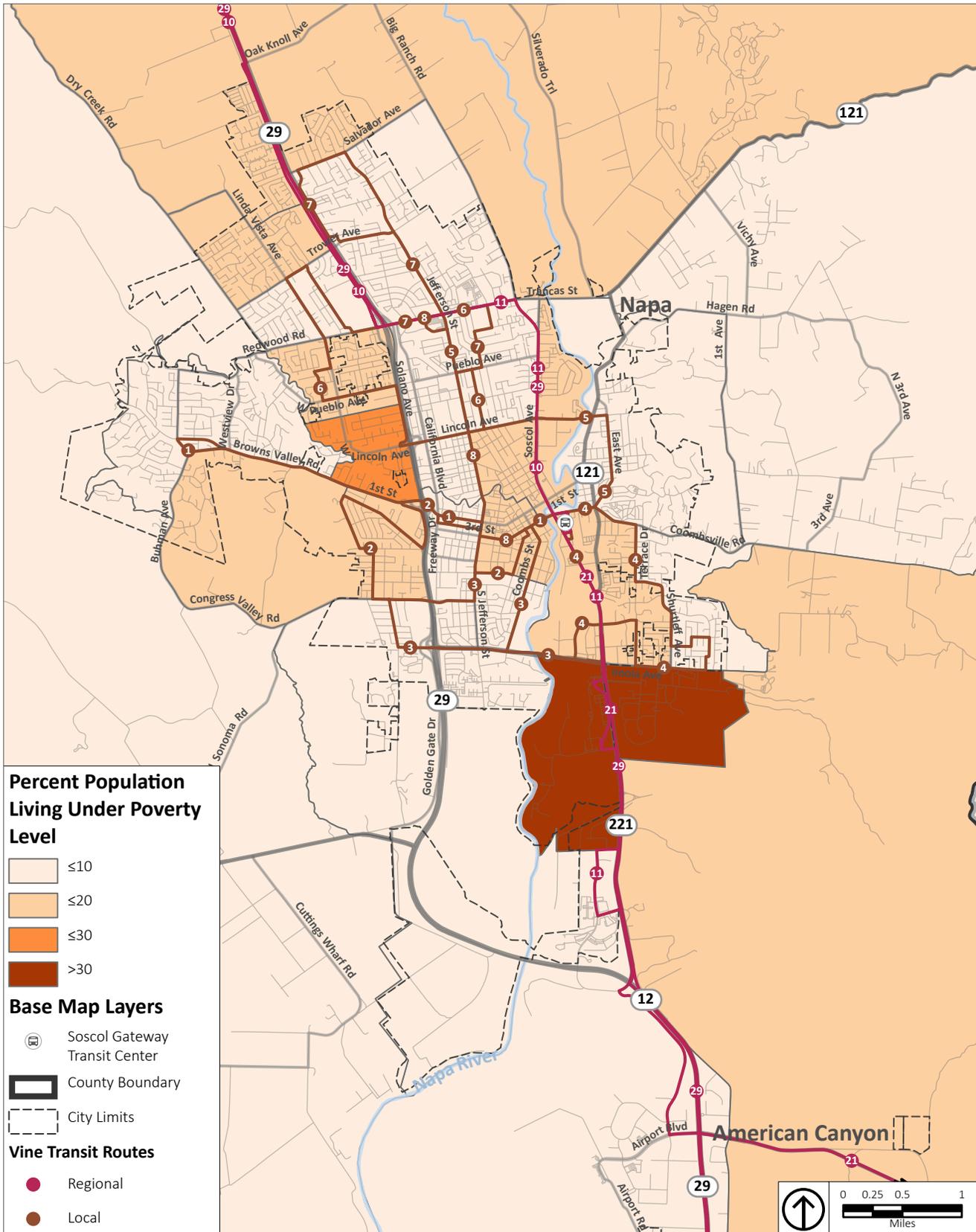


Figure 2-9: City of Napa Density of Population Living Under the Poverty Level

* Poverty - Individuals at or below the nationwide poverty level at the time the data was collected.

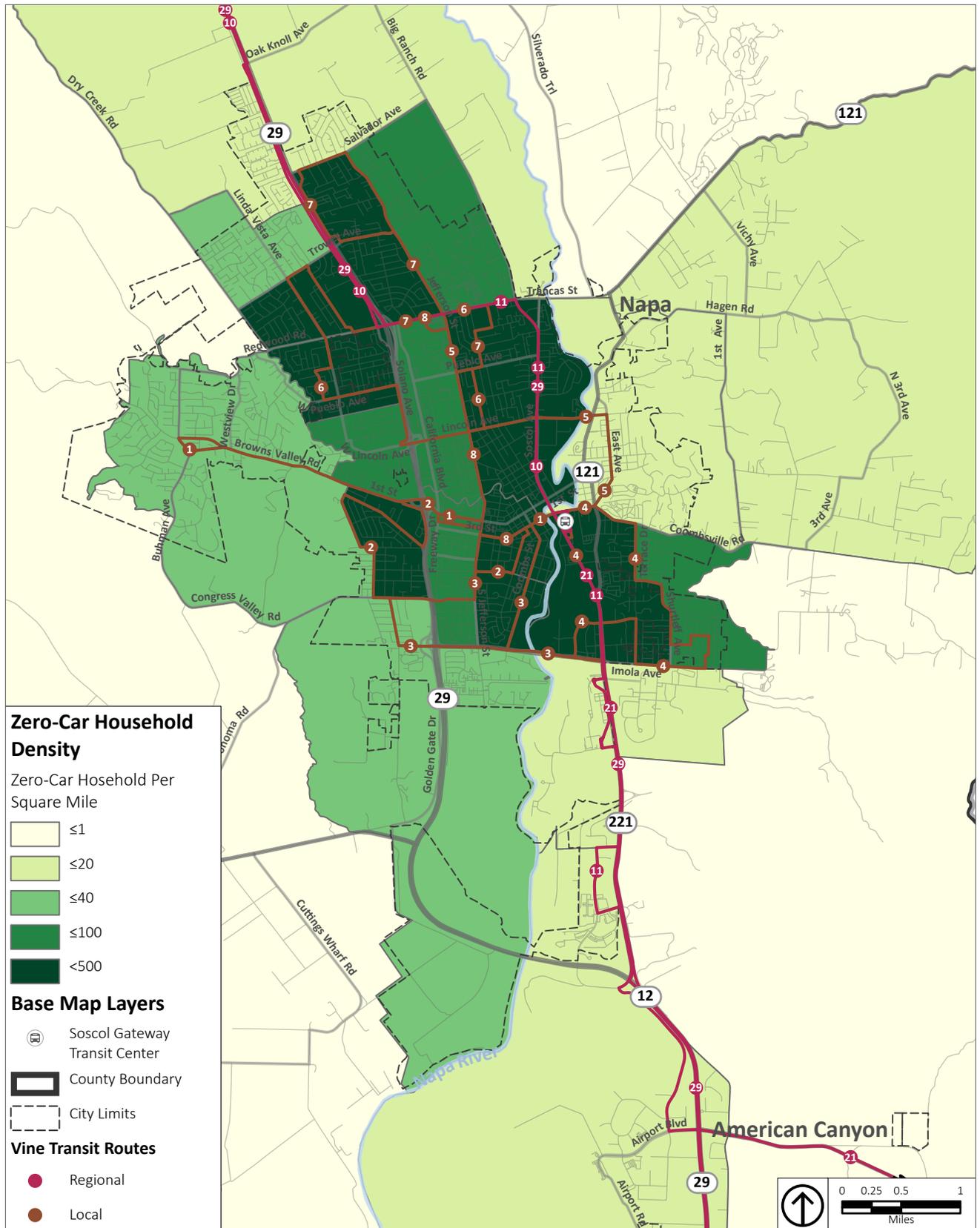


Figure 2-10: City of Napa Zero-Car Household Density

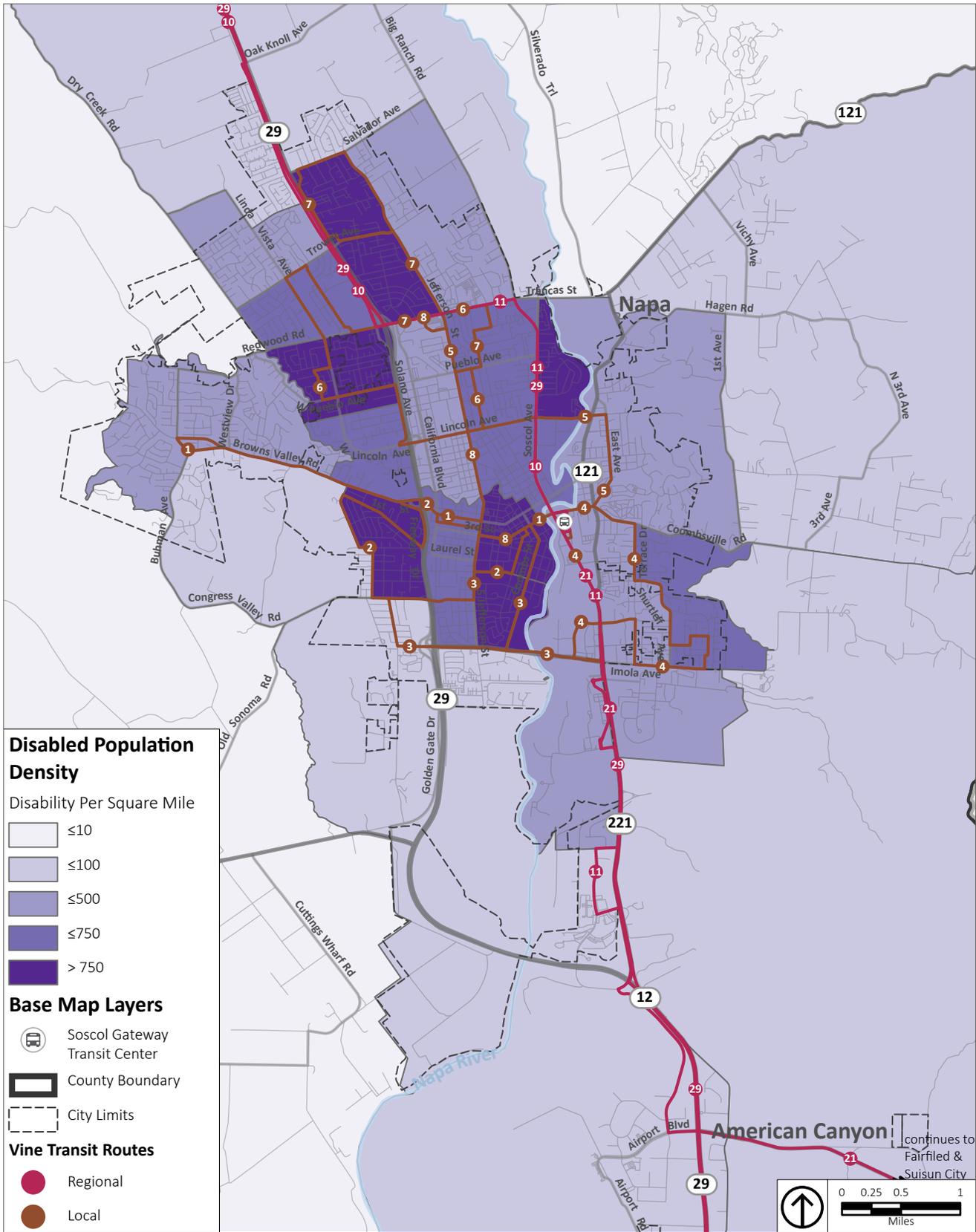


Figure 2-11: City of Napa Disabled Population Density

2.2.1 City of American Canyon

The City of American Canyon's age 65 and older population represents 9.6% of the total population. As shown in *Figure 2-12* the highest concentration of seniors are located south of American Canyon Road. This area of the City has a disproportionate number of mobile home parks. Mobile home parks often attract seniors because of their affordability. The less dense senior populations are located in the northern areas of the city.

American Canyon has the highest youth percentage of any city in Napa County at 21.3%⁴, well above the Bay Area average of 16%. *Figure 2-13* illustrates the concentrated densities of youth within the City; surprisingly matching those of the senior population.

Eleven percent of the population in American Canyon lives below the poverty line. The median household income is \$75,997 according to the most recent data from the ACS 2011-2015 Five Year Estimates. As shown in *Figure 2-14* the tracts containing the highest density of poverty are consistent with those of youth and senior populations.

American Canyon has the lowest rates of car free households in Napa County at 1%. As illustrated in *Figure 2-15* the majority of the city shows twelve households or less being car-free per square mile. The highest density of car-free households lines up with the quadrant of the city that has the highest concentration of senior and disabled populations. American Canyon is considered a "bedroom community" where many workers commute to the central Bay Area, and the lack of car-free households underscores this characterization. It is likely that the majority of residents are using their cars to go to work outside the City – a major contributor to the congestion on Highway 29 and an opportunity to attract commuters to improved express bus service.

Disabled populations follow similar patterns to senior and youth populations as seen in *Figure 2-16*. Concentration of disabled populations in a specific area makes it easier to provide transit service to these communities.

4 MTC. Bay Area Census. <http://www.bayareacensus.ca.gov/cities/AmericanCanyon.htm>

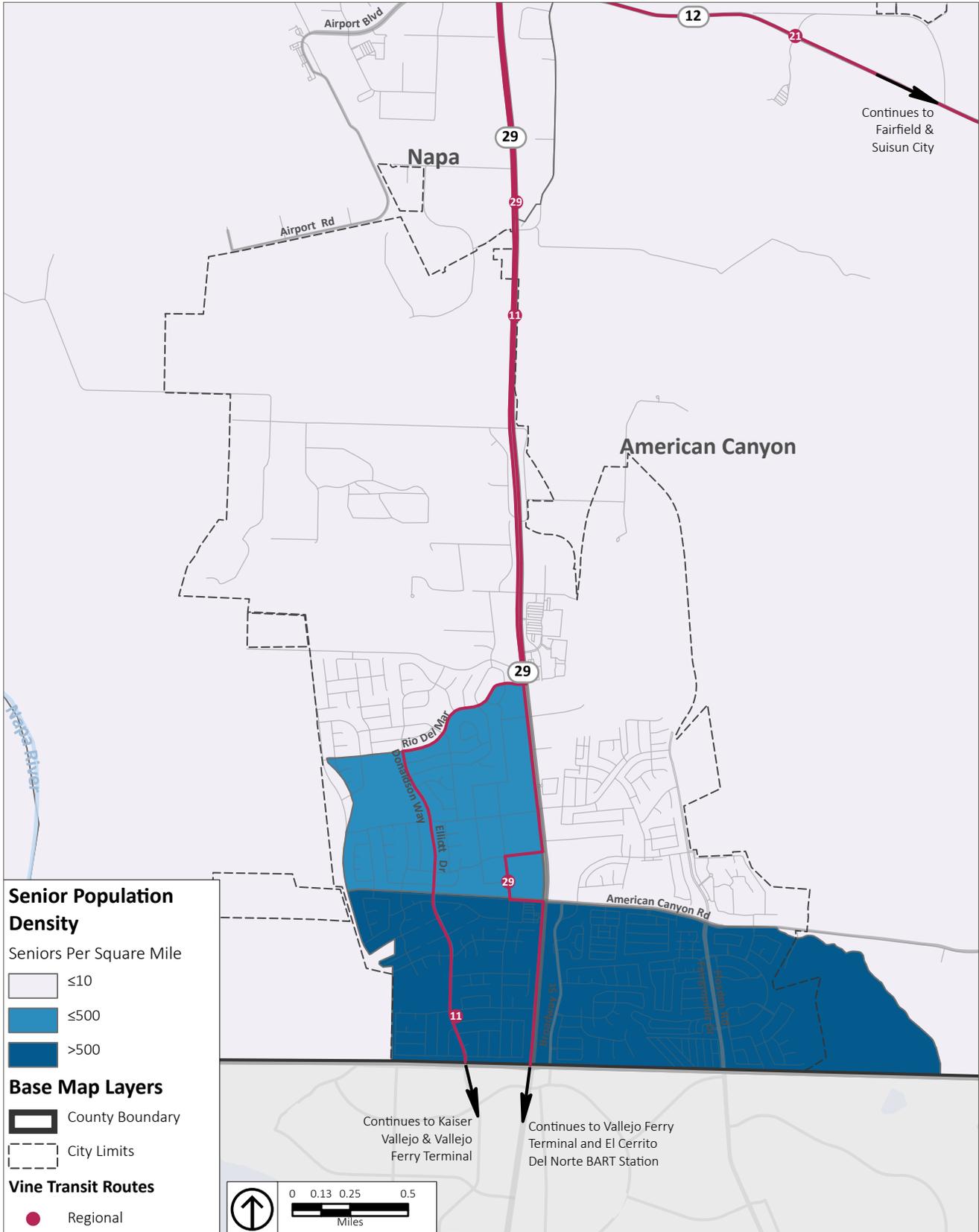


Figure 2-12: City of American Canyon Senior Population Density

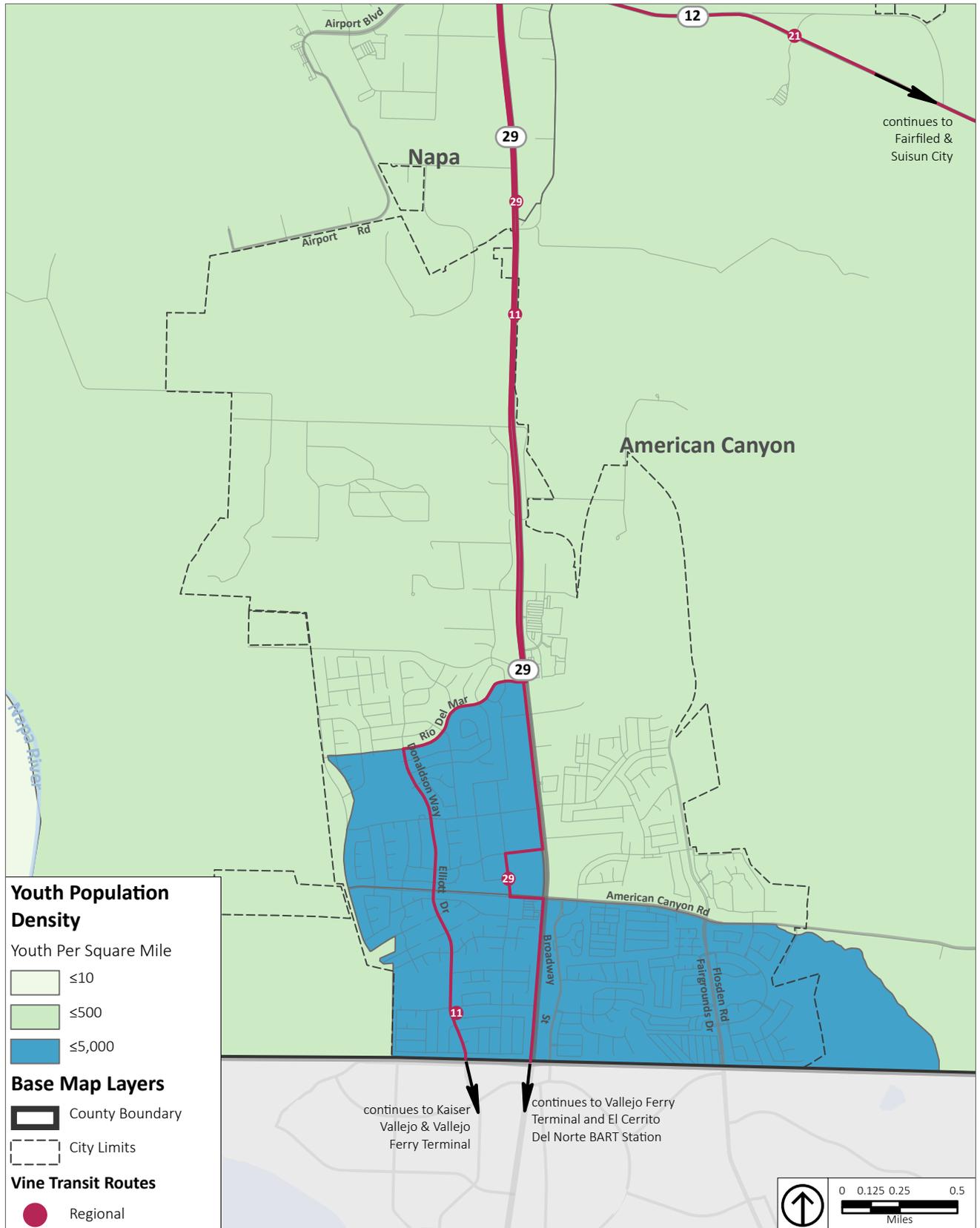


Figure 2-13: City of American Canyon Youth Population Density

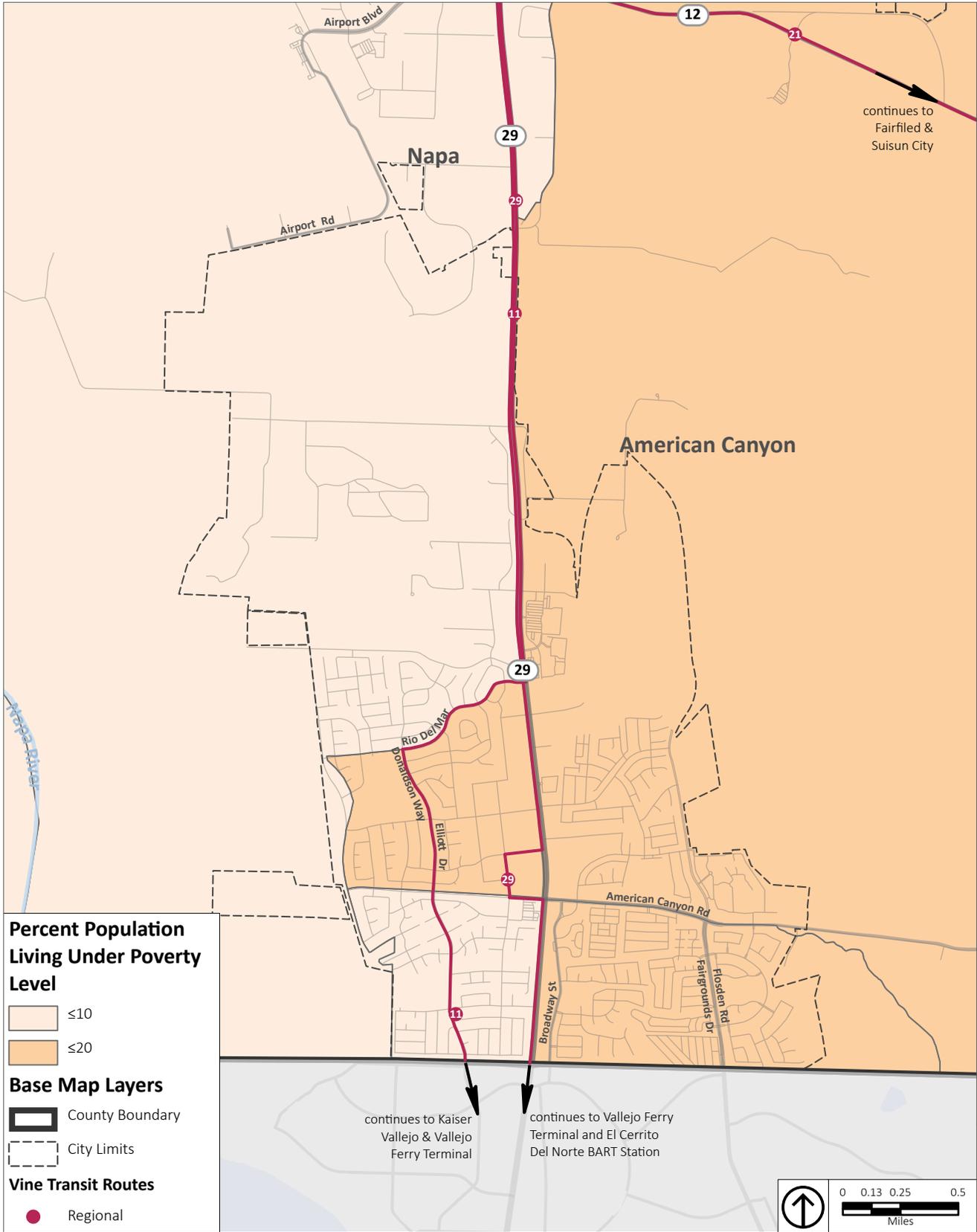


Figure 2-14: City of American Canyon Density of Population Living Under the Poverty Level

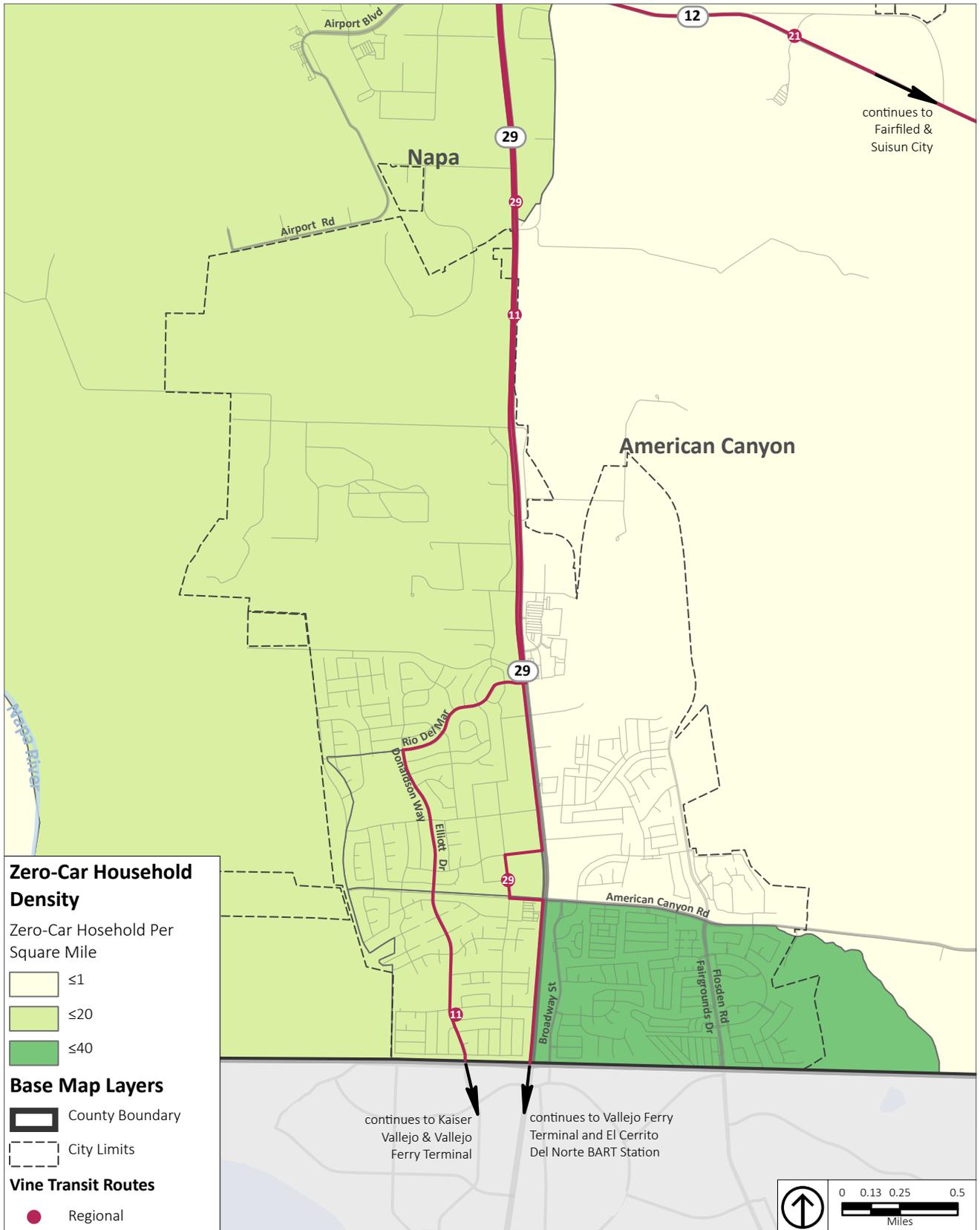


Figure 2-15: City of American Canyon Zero-Car Household Density

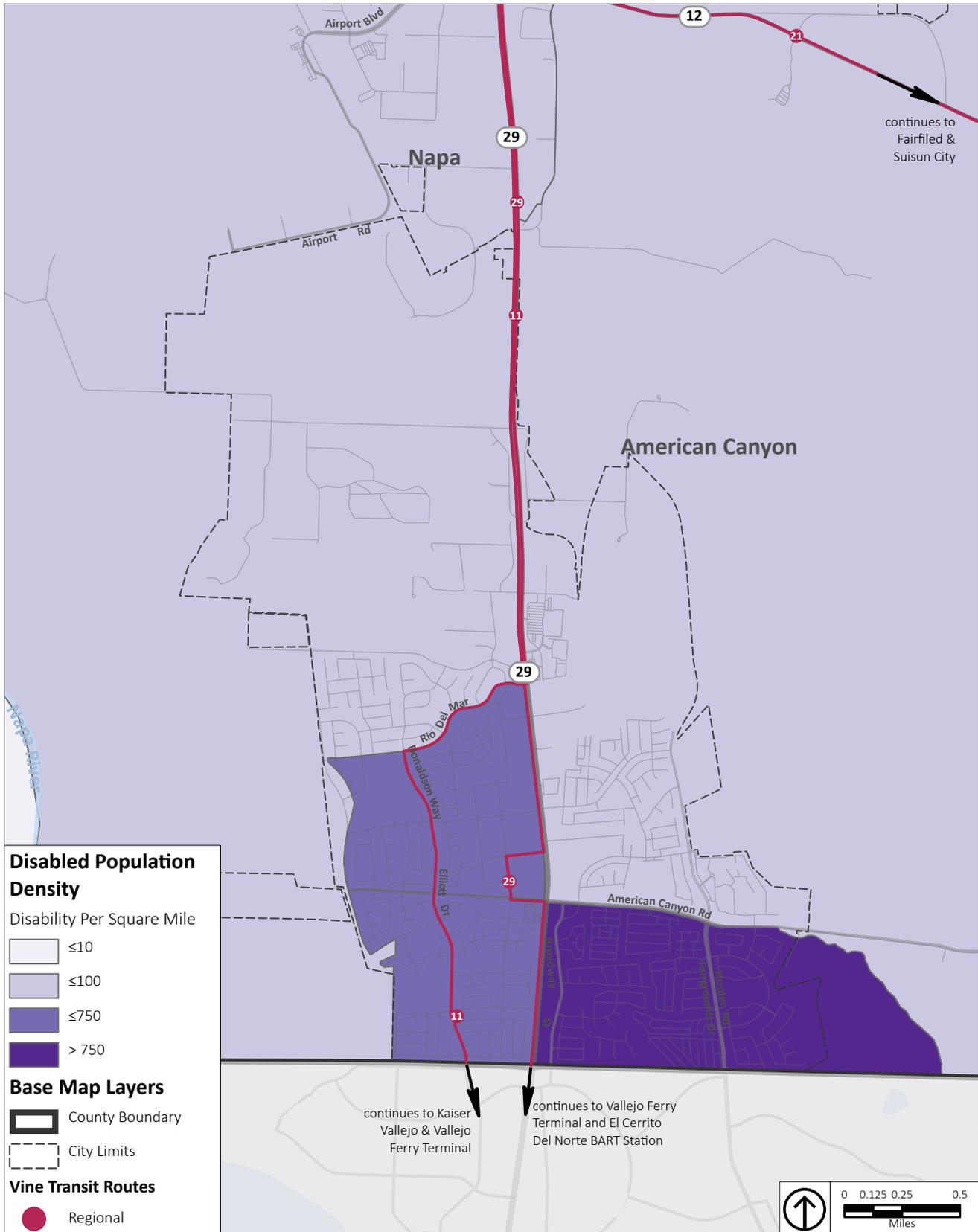


Figure 2-16: City of American Canyon Disabled Population Density

2.2.2 Up Valley Communities

A higher percentage of senior residents reside in Up Valley communities as compared to the rest of the county (*Figure 2-17*). Yountville's 65 and older population is 48.7%⁵. A contributing factor to this high percentage is most likely the Veteran's Home located within the Town's boundaries. Calistoga has several large mobile home parks which contribute to it also having a high concentration of seniors.

Calistoga and St. Helena have lower youth populations, 15.8% and 16.6% respectively, as compared to the County of Napa as a whole (17.1%). Yountville has the lowest number of youth in the County at 5.9%. In Yountville the highest concentrations of youth reside in the same tracts as those of seniors while in St. Helena they are the opposite. Calistoga's youth population in *Figure 2-18* shows an even distribution throughout the city.

Poverty levels in the Up Valley Communities come in wide ranges (*Figure 2-19*). Calistoga has the highest percentage of individuals living in poverty at 10.5%; St. Helena and Yountville come in at 5.7% and 5.3% respectively. All these communities fall above the county average of 5.1% and Calistoga at 10.5% is the second highest in the county, just behind the City of Napa (11.7%). In Yountville concentrations of low income populations do not exist, as only about 100 people or less live in poverty per square mile. Calistoga and St. Helena have obvious concentrations of individuals living in poverty which follow the pattern seen for youth populations.

Concentrations of zero-car households are on the low side throughout the census tracts in the Up Valley Communities (*Figure 2-20*). Yountville proves to be an exception, most likely due to the Veteran's Home where residents are less likely to own a vehicle.

Disabled populations are relatively uniform within each of the cities (shown in *Figure 2-21*). St. Helena is an exception with an obvious north/south divide of disabled populations.

2.2.3 Unincorporated Areas

The unincorporated areas of Napa County show an even distribution of low densities of senior, youth, low income, zero-car, and/or disabled population. The areas east and south of the City of Napa's limits are an exception. Senior population densities in the area east and south are comparable to some tracts within the city limits. Seniors, as they age further, may find it increasingly difficult to drive, requiring public transit to be a source of mobility. The populations living in these outlying areas are difficult to serve and create a unique challenge for NVTA.

5 MTC. Bay Area Census. <http://www.bayareacensus.ca.gov/cities/Yountville.htm>

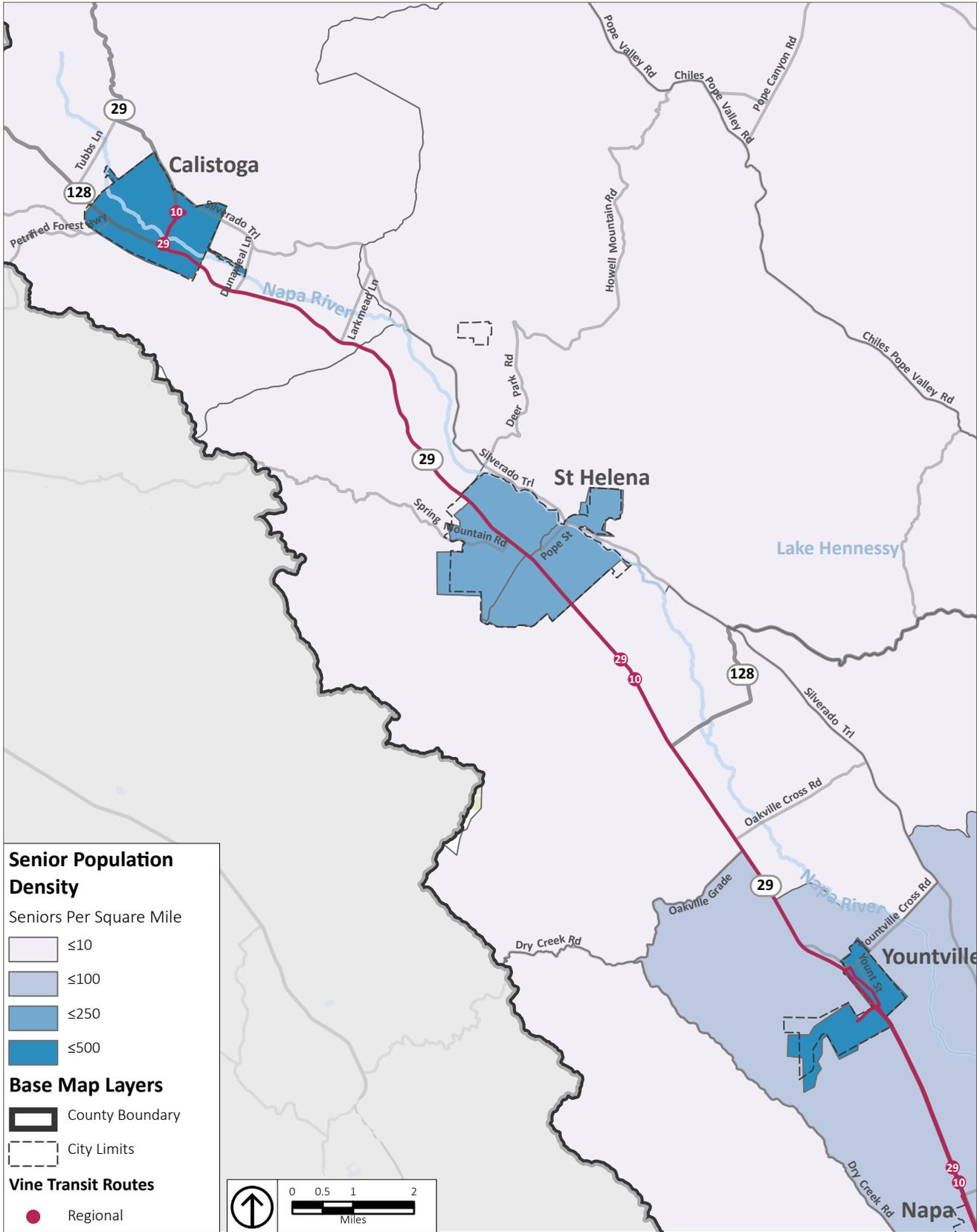


Figure 2-17: Up Valley Communities Senior Population Density

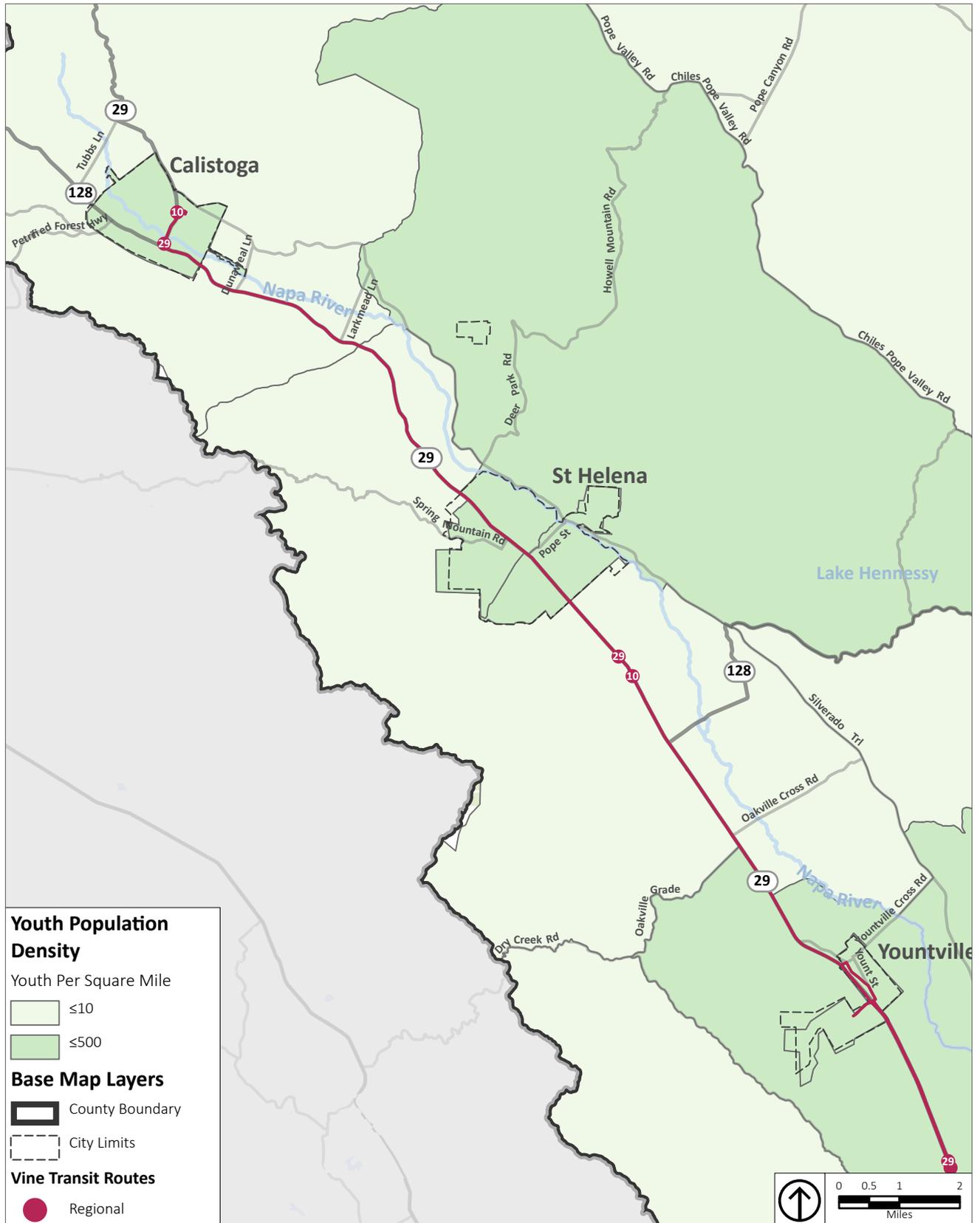


Figure 2-18: Up Valley Communities Youth Population Density

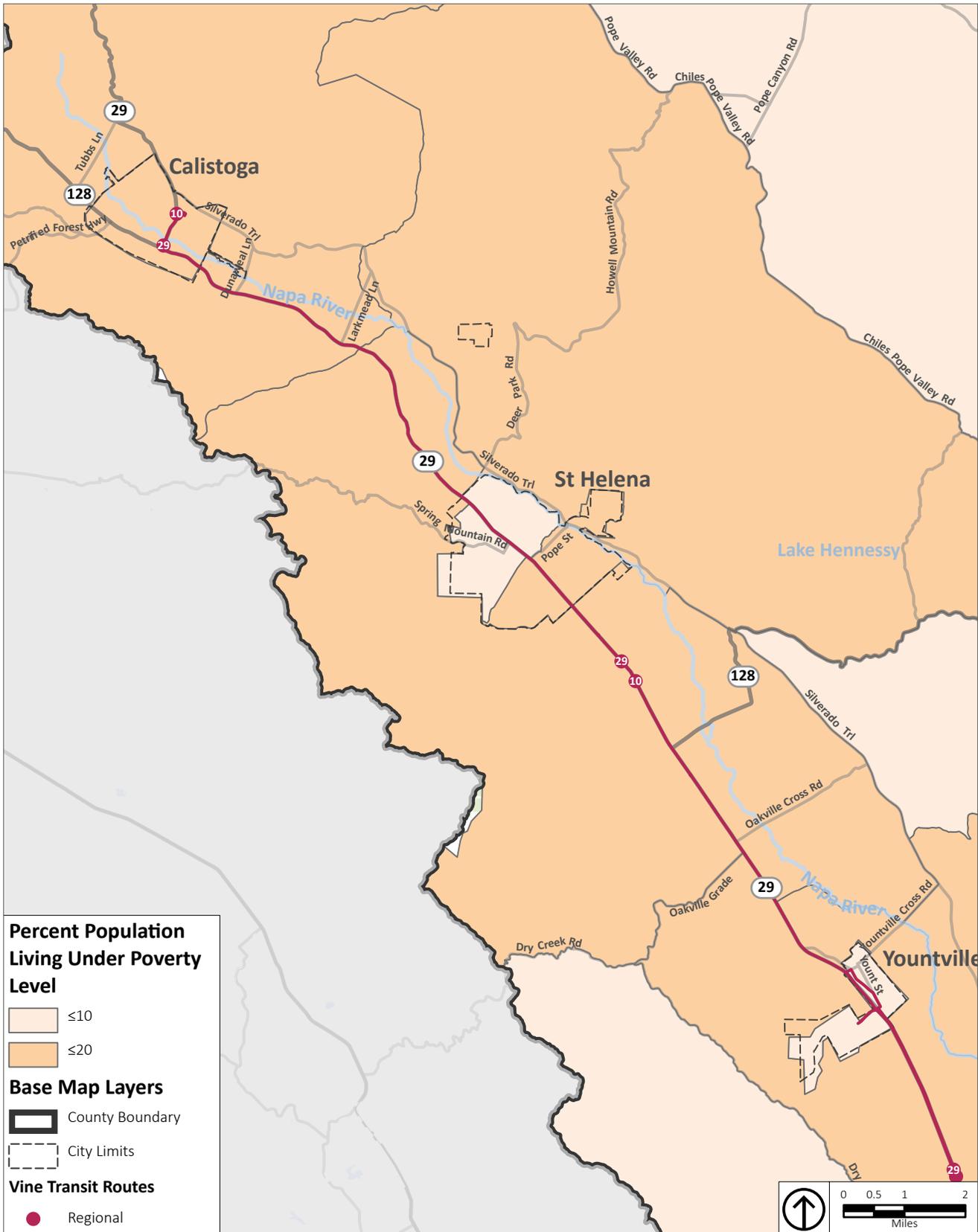


Figure 2-19: Up Valley Communities Density of Population Living Under the Poverty Level

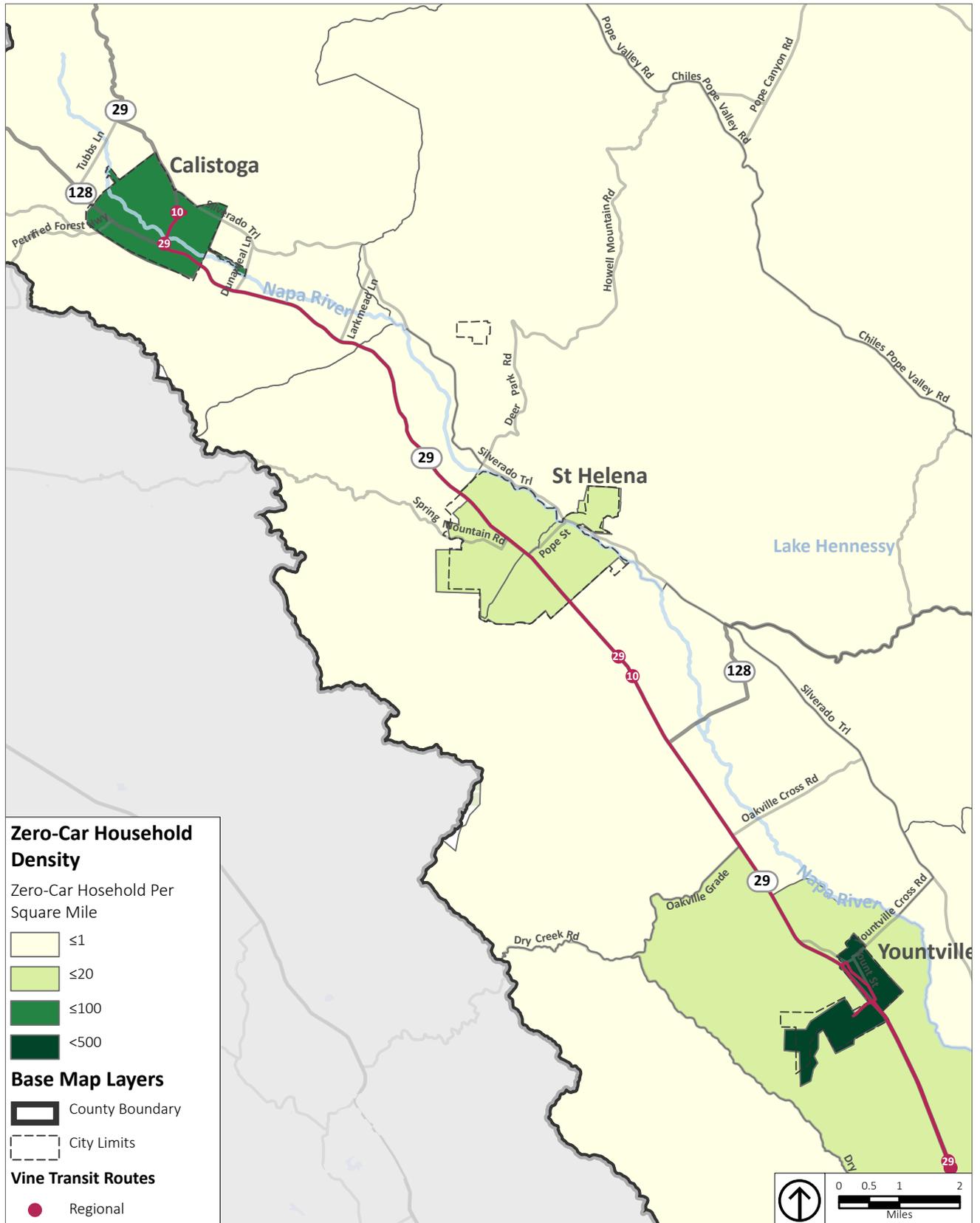


Figure 2-20: Up Valley Communities Zero-Car Household Density

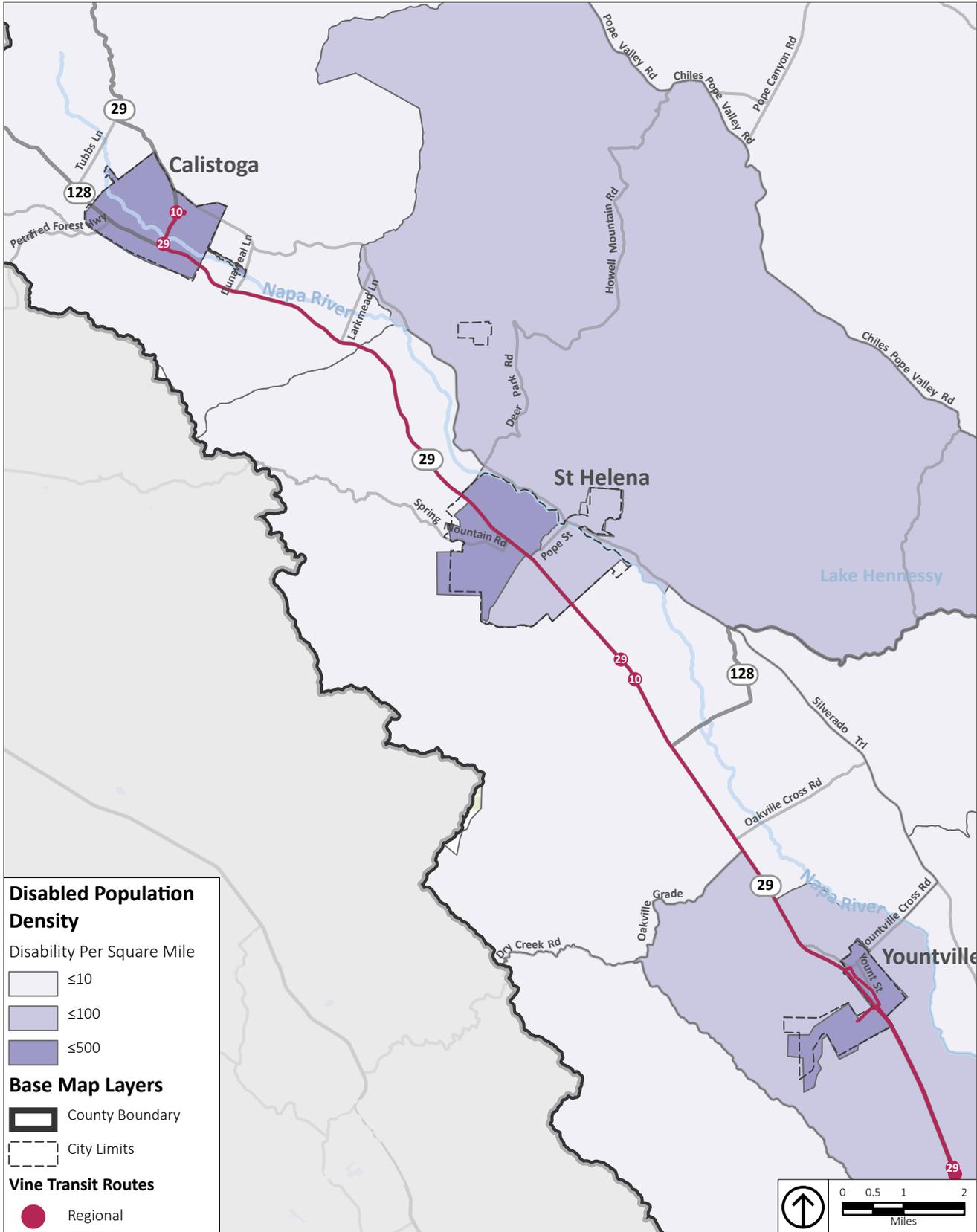


Figure 2-21: Up Valley Communities Disabled Population Density

2.3 MAJOR DESTINATIONS

Large employment centers, medical facilities, and city centers provide a solid anchor for transit service. Identifying the location of these destinations can help align service so that route termini are major destinations. NVRTA will also identify locations that may not serve as anchors, but provide important services that are frequented by transit users.

2.3.1 Employers

Within each census tract reside major employers that drive employment densities. The top three employment sectors in Napa County are healthcare/social assistance (10,768 employees), manufacturing⁶ (10,262 employees), leisure and accommodation and food services (9,534 employees).⁷ Most health care and social assistance jobs are focused within the City of Napa, however the other two sectors are spread

out to a much greater degree. Healthcare and social assistance jobs create a twofold bonus for increasing ridership. Patients are the majority of individuals using transit to access these locations. Motivating the employees to use transit to get to work could be an added bonus without requiring a large restructuring of service. The top ten employers within Napa County are shown below in *Figure 2-22*. Six of the top ten employers are presently served directly by the Vine. A notable exception is St. Helena Hospital, due to its remote location. The hospital was previously served by the St. Helena Shuttle but was discontinued due to lack of ridership and exacerbated wait times for all other users caused by the shuttle service to the hospital.

⁶ Includes wine making.

⁷ American Fact Finder. 2011 County Business Patterns: Geography Area Series: County Business Patterns. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=BP_2011_00A1&prodType=table

Figure 2-22: Top Ten Employers in Napa County⁸

Employer	Rank	Employees	% of Total County Employment
Napa State Hospital	1	2,300	3.6%
Napa Valley Unified School District	2	1,900	3.0%
Queen of the Valley Hospital	3	1,365	2.1%
County of Napa	4	1,248	2.0%
St. Helena Hospital	5	1,050	1.6%
Veteran's Home at Yountville	6	1,000	1.6%
Trinchero Family Estates	7	675	1.1%
Treasury Wine Estates	8	600	0.9%
Comcast	9	500	0.8%
City of Napa	10	458	0.7%

⁸ City of Napa. 2016. Napa City and County Major Employers. http://www.cityofnapa.org/images/economicdevelopment/economicdevelopment/2016%20Napa_City_County_Major_Employers.pdf

Business parks containing multiple employers can act as large trip generators. However due to their size it can be hard to serve all businesses in a direct manner. The Vine currently serves two business parks within the County in some capacity. The most direct service is provided to the Corporate Park area which contains major employers such as the Meritage Resort and Napa County Health and Human Services. The industrial area around the airport along Devlin Road is also served by the Vine; however, accessing many of the businesses can require a quarter mile walk in areas without sidewalks. The Vine does not provide transit service to Executive Court Center which is located on the northeast corner of Highway 12 and Highway 29.

2.3.2 Schools

Schools are a major source of demand for transit. That demand is primarily generated by individuals attending high school or college. There are six high schools directly served by the Vine in Napa County. The Vine also provides direct transit service to Napa Valley College, a community college located on the City of Napa's southern border. The college enrolls roughly 7,000 students. A majority of the elementary schools are also served by the Vine, however very few elementary school students use public transit to get to school.

2.3.3 Lifeline Destinations

Providing public transportation to essential services not only increases transit ridership, it ensures individuals without an automobile or individuals that cannot drive have access to critical *lifeline* services. Lifeline services include food, medical, and social services. Access to lifeline services is a basic building block for a decent quality of life and a better community. Identifying the locations of these services was a high priority of the Market Assessment.

2.3.3.1 Food

Access to food can be challenge for some people, especially those who are low income. Transit can assist in creating better access to food for these populations. Providing good transit connections between low income neighborhoods and sources of food⁹ could boost ridership and improve the quality of life for individuals who do not have access to an automobile or are not able to drive. The Vine directly serves all major grocers in the County. However the Vine does not provide direct service to the food pantry located in downtown Napa. The food pantry is about a third of a mile walk from the closest bus stop. Anything beyond a ¼ mile walk would exceed the standard for providing good transit services. The walk becomes more burdensome if potential riders are carrying groceries. Ensuring better access to food locations is a major consideration for NVTA and will be paramount as the planning process moves forward. *Figures 2-23, 2-24, and 2-25* are maps of all food locations within the Napa Valley providing a baseline for transit service and the access it provides to food.

9 For the purpose of this document NVTA has categorized "sources of food" as locations providing grocery staples e.g. meat, fruits, vegetables, dairy, and grains. It should also be noted that some of the locations identified can be considered "boutique grocers" providing less affordable options to low income populations. However these are included to remain consistent with NVTA definition of "sources of food".

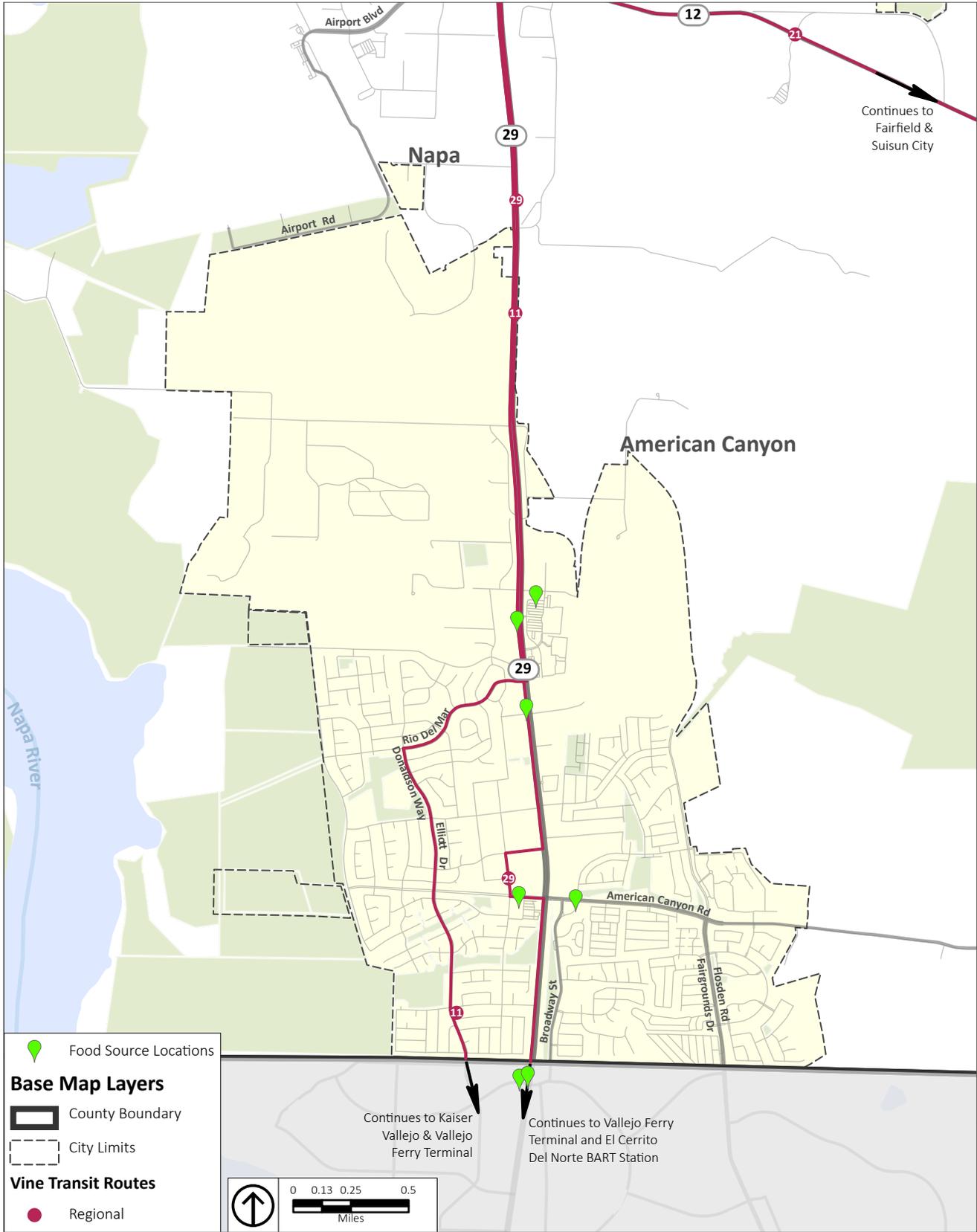


Figure 2-24: City of American Canyon Food Source Locations

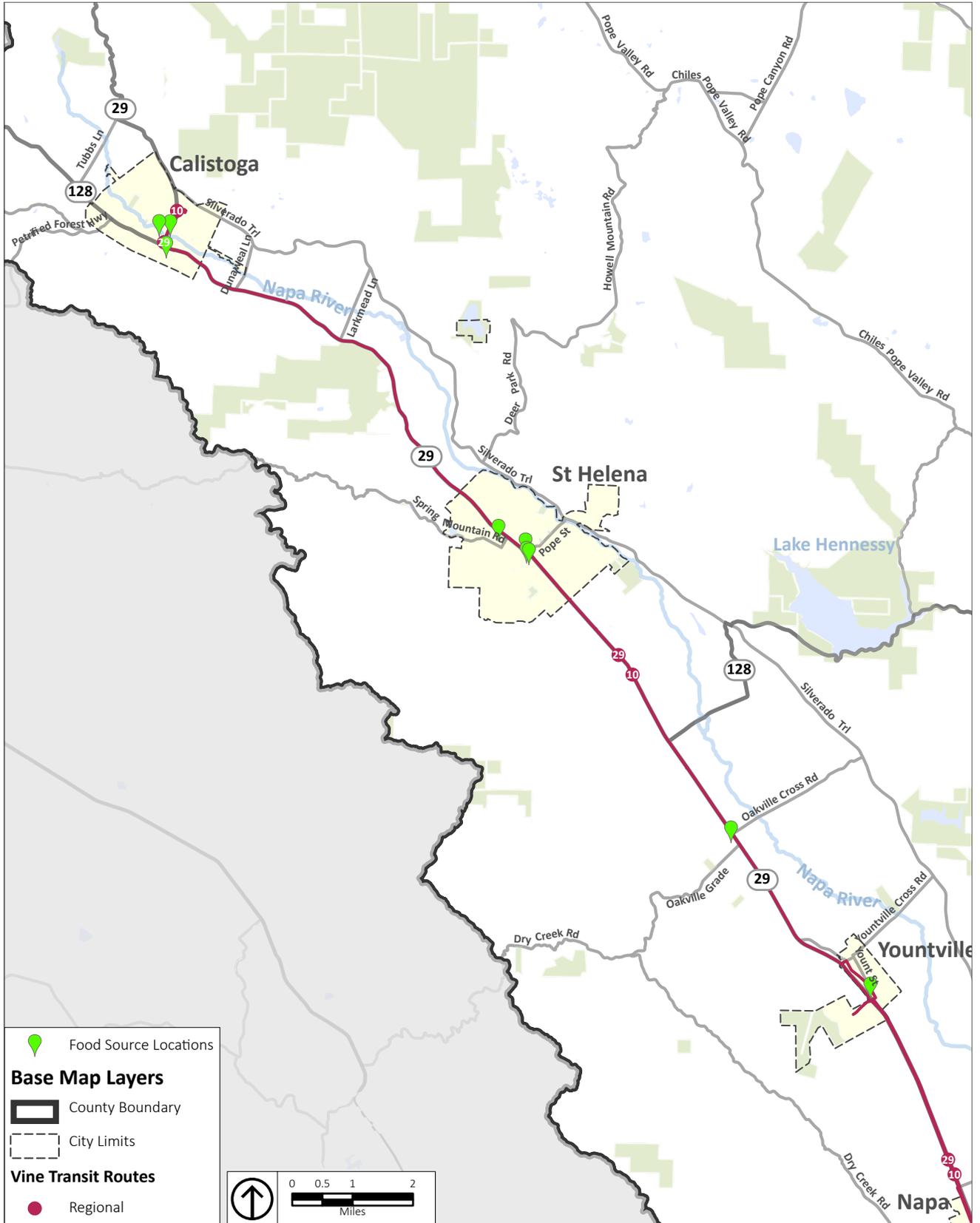


Figure 2-25: Up Valley Food Source Locations

2.3.3.2 Medical

Medical facilities are one of the most frequented destinations by transit users. There are two major hospitals served directly by the Vine, Queen of the Valley and Kaiser Vallejo. Multiple medical clinics are also served throughout the County. One notable exception is St. Helena Hospital, because of its stand-alone location which is a significant distance from the center of St. Helena. Most medical clinics and Queen of the Valley Hospital are located along or around the Trancas corridor. The consolidation of facilities like this makes serving them with high frequency an easier endeavor. Napa State Hospital is also listed as a medical facility, however, it serves psychiatric patients and there are no out-patient services. Since the patient population is committed to the facility, any improvement of service to the location would be for employees and visitors.

2.3.3.3 Social Services

The locations of the social services are interspersed throughout the County. Several are located in the downtown area. Others are concentrated along the Trancas corridor, working in tandem with the medical facilities. One of the largest providers of social services is Napa County Health and Human Services. Until recently the campus was located in central Napa with two routes serving it on half hour headways. The campus has moved to Napa Valley Corporate Drive in south Napa. The new location is served by the Route 11 which runs on hourly headways. County of Napa staff has indicated that this is an insufficient level of service to move people to and from the campus. To improve service, the County has implemented a free shuttle to deliver people to the new campus. The shuttle circulates through downtown Napa, the old Health and Human Services campus, and the Soscol Gateway Transit Center before dropping off at the new campus. As the COA moves forward, NVTA will further evaluate the demand for transit services to the Health and Human Services campus.

3.

Travel Patterns

Each person's travel patterns are unique to their needs. While each person's pattern is unique, there are often common origins and destinations. This section will look at the travel patterns across all modes and all users of transportation in Napa and the surrounding counties. This information will be used to determine how transit could capture additional riders, specifically along heavily traveled corridors.

2.4 TRAVEL BEHAVIOR STUDY

NVTA commissioned the Napa County Travel Behavior Study in December 2014 to gather information on the travel behavior of visitors, employees, residents, and students who make work and non-work trips in Napa County. NVTA's consultant, Fehr and Peers, utilized and combined the results of the five data collection methods described in *Figure 2-26* to capture travel behavior in and through the County. The figure provides methods used along with a list of advantages and limitations of each method. Data from these different survey methods will be discussed throughout this section.



“25% of traffic coming into Napa County is imported work trips.”

2.5 INTER-COUNTY PATTERNS

Inter-county travel refers to travel in and out of Napa County from the surrounding counties, primarily Sonoma, Solano, Yolo and Lake Counties. Trips from outside the region were also taken into account. Travel from surrounding counties tends to follow a consistent pattern for work and school, while travel from the larger Bay Area and Sacramento mega region is more likely tourist driven. The *Napa County Travel Behavior Study* showed that 45% of the trips in Napa County are external trips including 36% that are imported/exported and 9% that are pass-through trips derived from the License Plate Matching method. The other 55% of the trips are internal trips and will be discussed in the next section on intra-county patterns.

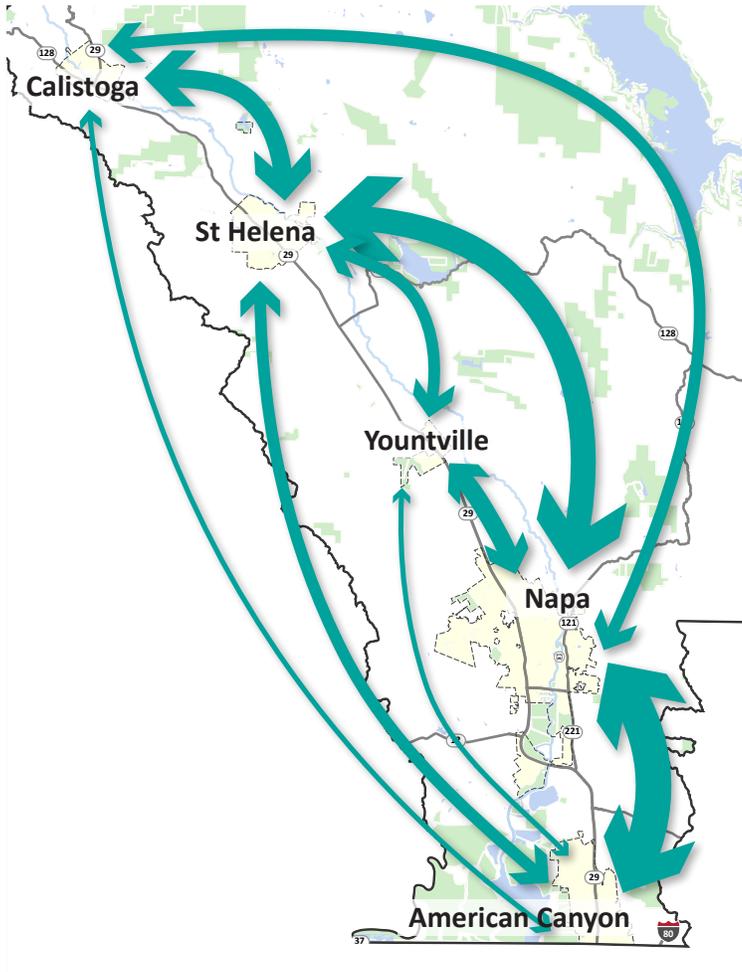
Inter-county travel has a major impact on Napa County employment and congestion. There is a growing job market in Napa County but new housing starts are not keeping pace with that growth. Moreover, the job growth is concentrated in lower income jobs, and the cost of housing in the county is extremely high, making housing unaffordable for many of Napa's workers. The high cost of living in Napa also results in exporting its residence to higher paying jobs in the central Bay Area which further exacerbates the travel pattern and congestion in the Valley.

As noted earlier in the Market Analysis, Up Valley communities like Yountville and St. Helena have a high concentration of jobs and small populations. These populations are also dominated by senior citizens who are no longer working. Consequently, service industry jobs that dominate the job market are held by individuals who live elsewhere in the Napa Valley or outside the County. The *Napa County Travel Behavior Study* indicates that “25% of traffic coming into the County is imported work trips”. This translates into about 45,300 trips per day given the total number of vehicle license plates counted. Given that there are only two major north/south arterials in the County, there is little opportunity to divert traffic elsewhere.

Figure 2-26: Travel Behavior Study Approach

Method	Advantages	Limitations
Vehicle Classification Counts	<ul style="list-style-type: none"> • Very accurate and only way to directly measure total traffic volume passing through a count location. • Provides control total to refine data collected via other methods. • Can be used to compare to travel demand model roadway volume by class. • Relatively cheap data collection method. 	<ul style="list-style-type: none"> • Does not provide the origin, destination, or purpose of the vehicle trip or any other trip making or demographic information.
Winery Regression Analysis	<ul style="list-style-type: none"> • Can use observed data at a few representative locations to predict data for the remaining locations, saving time and money. • Can be used to reveal causal relationships between independent and dependent variables. • Can be used to predict how a change in an independent variable will affect the dependent variable. 	<ul style="list-style-type: none"> • Assumes the sample is representative of the population which may not be the case, especially with wineries. • Sample size is often determined by pragmatic considerations. In this case, a wineries willingness to participate was a big determinant. • Key quantitative variables do not always behave in a way that fits neatly into a statistical model.
License Plate Matching	<ul style="list-style-type: none"> • Provides information such as the number of vehicles that travel through the region, their entry and exit points, their travel time between points, and percent makeup of total traffic. • Provides data in a format more suitable for comparison and integration with travel demand models such as the NSTDM. 	<ul style="list-style-type: none"> • Unable to provide information regarding trip purpose, frequency, starting or ending point, characteristics of travel or demographics. • Only captures trips that pass through a count location.
In-Person Winery, Vehicle Intercept, and Online Employer Surveys	<ul style="list-style-type: none"> • Provides detailed information regarding trip purpose, occupancy, frequency of travel, demographics, class of vehicle, and other travel characteristics. • Provides data in a format and at a level of disaggregation more suitable for comparison and integration with travel demand models such as the NSTDM. 	<ul style="list-style-type: none"> • Depending on the response rate, may only provide detailed trip purpose, occupancy, and class of vehicle information for a percentage of observed trips. • Only captures trips that pass through at least one survey location. • Development and implementation of survey of a sufficient size to be statistically valid can be costly. • Prone to human error during the data collection process as well as from the survey responders who may misinterpret the questions.
Mobile Device Data	<ul style="list-style-type: none"> • Very large sample size able to provide information regarding all types of trips that occur in Napa County. • Provides origin-destination data in a format more suitable for comparison and integration with travel demand models such as the NSTDM. • Data can be queried, aggregated and disaggregated to match desired level of analysis. • Data collection method does not require set up time or human transcribing of observed field data which can potentially introduce error. 	<ul style="list-style-type: none"> • Unable to directly measure information regarding trip purpose, frequency, characteristics of travel or demographics. However, much of this information can be inferred or supplemented with information from other sources. • Collection and aggregation of data can be costly but provides a much larger sample size than other methods.

Napa County Commuter Flow, City to City



Additional data from the Mobile Device Data method is outlined in Figures 2-27, 2-28, and 2-29. External gateways are defined as State Routes (SR)-121, SR-128, SR-29 and SR- 12. The daily average trips coming into Napa on the weekdays number 66,986. The number of trips rises slightly to 69,863 on Fridays and then falls to 46,654 on Saturday when less work related trips are on the road. On weekdays and on Fridays, of people coming through external gateways the highest numbers are traveling to unincorporated parts of the County: 18,803 and 20,513 vehicles, respectively. The highly dispersed land use in the unincorporated areas in the County makes it challenging if not impossible to effectively serve this employment base with public transit alone.

The City of Napa and the City of American Canyon are the next most popular destinations. This information suggests that there is a need to focus transit on getting people from outside Napa County and American Canyon to the City of Napa for work. Once in these cities, local service can be used to get to final destinations.

Figure 2-27: Daily Average (Mon - Thurs) Weekday Vehicle Trips To and From the Five Major Cities in Napa County

Origin Location	Destination Location							
	Calistoga	St Helena	Yountville	Napa	American Canyon	Unincorporated County	Winery	External Gateway
Calistoga	2,062	444	47	360	95	1,586	544	780
St Helena	655	6,450	98	1,896	125	3,948	1,616	801
Yountville	7	246	870	905	54	1,332	475	303
Napa	397	1,793	1,018	63,359	2,766	19,801	3,099	17,329
American Canyon	14	256	118	3,320	6,316	3,814	333	11,367
Unincorporated County	1,381	4,474	1,106	18,514	3,267	40,469	12,053	21,083
Winery	665	2,111	497	3,376	962	11,041	3,646	3,993
External Gateway	1,723	841	270	17,464	12,780	18,803	3,902	11,203

Figure 2-28: Daily Friday Vehicle Trips To and From the Five Major Cities in Napa County

Origin Location	Destination Location							
	Calistoga	St Helena	Yountville	Napa	American Canyon	Unincorporated County	Winery	External Gateway
Calistoga	3,117	385	31	459	61	1,746	756	824
St Helena	949	5,055	211	1,340	61	3,750	2,008	455
Yountville	0	282	1,275	1,063	92	1,652	1,129	511
Napa	287	1,006	1,070	62,456	3,427	21,513	4,308	15,923
American Canyon	0	176	158	3,497	6,312	3,343	299	12,558
Unincorporated County	1,826	4,368	1,318	19,383	3,763	42,853	13,633	22,239
Winery	940	2,588	813	4,673	211	14,392	3,778	3,626
External Gateway	1,707	795	622	16,634	13,630	20,513	4,403	11,559

Figure 2-29: Daily Saturday Vehicle Trips To and From the Five Major Cities in Napa County

Origin Location	Destination Location							
	Calistoga	St Helena	Yountville	Napa	American Canyon	Unincorporated County	Winery	External Gateway
Calistoga	1,815	251	0	62	12	74	878	1,470
St Helena	265	2,037	37	564	25	160	1,779	1,255
Yountville	0	40	609	552	12	69	561	608
Napa	191	494	538	21,296	357	2,196	2,701	19,181
American Canyon	12	13	39	347	2,071	365	157	8,732
Unincorporated County	91	131	80	2,040	298	2,547	12,282	4,494
Winery	411	2,844	588	2,883	238	12,145	3,438	4,472
External Gateway	2,241	1,267	533	16,104	7,692	4,827	6,066	7,924



Tourists from the Bay Area and other locations create another catalyst for inter-county travel patterns. Tourists travel into and out of Napa County every day. Travel peaks on Thursday through Saturday with a low point on Tuesday when many of the wineries are closed. The Winery Regression Analysis portion of the *Napa County Travel Behavior Study* indicates that winery vehicle trips amounted to 52,245 on Thursday, 62,217 on Friday and 54,713 on Saturday. A simple linear regression analysis was used to calculate vehicle trip generation for the existing 434 winery parcels in Napa County. It is a long held perception that the congestion in the Napa Valley is caused by tourist. The travel behavior study would indicate tourists are a source of congestion, especially on Thursday, Friday, and Saturday, however they are not the primary source. Tourist coming from outside the County could be a boon for transit ridership; however it is a difficult demographic to attract to public transit.



Very few major gateways to Napa County exist. Traffic is primarily funneled through SR-29, SR-12, SR-121, and SR-128. Residents, employees, and tourists alike are forced through these traffic choke points. Surface streets are not conducive for diverting local traffic, because there are few and those that exist are frequently congested with local traffic.

2.6 INTRA-COUNTY PATTERNS

Intra-county travel refers to trips taken within Napa County. The *Napa County Travel Behavior Study* indicates that 55% of trips in Napa County are internal, for both work and recreation. The tables in the Inter-County Patterns Section offer valuable information on intra-county patterns. The majority of people traveling in the county start and end their trip in the City of Napa on weekdays. For example, on an average weekday 109,562 vehicle trips start in the City of Napa and 63,359 end in the City. On Saturday 46,954 trips start in Napa and only about half (21,296) end there. The remaining 19,181 Saturday trips lead to an external gateway.

Survey data from the *Express Bus Study* was able to provide further information on travel within the County. The survey indicated that of City of Napa respondents, 43% worked in St Helena, 8% in Yountville and 6% in Calistoga.¹⁰ All other City of Napa respondents worked outside of Napa County representing less than 3% of respondents. The City of Napa is the largest incorporated area within the County and its residents are responsible for more trips than any other area in the county. Data indicates local service within the City of Napa will continue to be crucial and more frequent service from Napa to St. Helena is needed. It should be noted that the results of this survey were not statistically significant. However, it does show there is a jobs-housing connection between Napa and St. Helena that could be served by transit.

¹⁰City of Napa residents would work in the City of Napa are not including in calculations

The City of Napa's residents are responsible for more trips than any other incorporated area in Napa County.



4

Future Development

All future developments for the five incorporated cities and the unincorporated areas of the County were reviewed to assist in predicting future transit needs. Staff identified eighteen projects of significant scale that could require NVTA to make substantive service changes to meet or garner further demand for transit service. Of the projects identified, ten are in the City of Napa, two in Calistoga, one in St. Helena, one in Yountville, and four in American Canyon. The projects in the unincorporated parts of the County have not been taken into consideration as the majority of the projects will be wineries or winery expansions. Their location makes them inaccessible to public transit and it is believed they would not create enough demand for efficient service. NVTA has considered serving wineries in the past, but due to geographic dispersion of wineries and poor road connectivity it makes serving wineries with public transit a challenge. Opportunities do exist with the wineries and resorts in regards to their employees. Working with the wineries and resorts to establish vanpool programs for their employees to and from the main transit corridor could be a boon for congestion relief and transit ridership. Public transit can provide the bulk of one's commute but completing shorter more customized trips will require buy-in from employers.

The projects within Yountville, Calistoga, and St. Helena will be located within a half-mile distance of existing transit routes, or accessible via the community shuttles. The two new resorts currently under construction in Calistoga and the St. Helena Hotel are located on or near the SR-29 corridor and consequently because of their proximity, create the potential for building transit ridership. These developments will primarily be used by tourists.

Tourists have a high propensity for community shuttle use. Once these projects are operational NVTA will need to monitor usage to ensure community shuttle capacity can keep pace with demand. Most of the resort/hotel employees will be service positions making nominal wages. Employee income levels are not likely to be sufficient to live in the Calistoga/St. Helena area. Route 29 and Route 10 are likely to be useful services and as part of this study, NVTA will evaluate the efficacy of altering the express bus routes' span of service to accommodate the schedules of these service industry workers.

Of the ten development projects identified within the City on Napa, nine are currently accessible to transit riders through the current route network. The remaining project, Napa Pipe, is a large development and combined with its proximity to downtown, is likely to result in additional transit ridership. The project's total area is 154 acres, and will have 700-945 dwelling units, 40,000 square feet of neighborhood serving retail, a 150 room hotel, 150 units of senior/assisted living, and 10,000 square feet of office space. Additionally, there is a 154,000 square foot Costco and a 10 acre school site planned for the project. With the number of units for both commercial and residential use, it will be a major destination and most likely supportive of additional transit service.

Of the four projects identified in American Canyon, two are within the industrial area of the city. These could potentially be served by expanding Route 11. The other two projects are both located in the eastern part of the City. Presently there is no fixed route service in the eastern part of the city; instead residents rely on American Canyon Transit for service in this area. Combined, these two projects total 1,462 residential units and a 600 student elementary school. Both projects could generate enough demand to consider adding a stop near American Canyon Road/Newell Drive, and/or along Broadway/Donaldson Drive. The City has plans to extend Newell Drive to South Kelly Road. If this occurs, providing express bus off the state route on the east side of the City could be considered at a future date.

5.

Rider Profile and Transit Propensity

Every demographic group, no matter their ethnicity or socioeconomic status, shows a propensity to use public transit. However, through survey data transit agencies can identify specific markers that point to groups of individuals who are more likely to use transit than other groups. By analyzing Census and American Community Survey results, as well as data collected from the 2014 On-board Survey conducted by the Metropolitan Transportation Commission (MTC), NVRTA has been able to create a profile of a “typical” Vine rider. Using this information NVRTA can locate where in Napa County the highest concentrations of potential Vine riders reside.

2.7 RIDER PROFILES

Demographic questions were asked of transit riders as part of the survey conducted by MTC in 2014. This data applies directly to individuals already using transit. The US Census and American Community Survey provide demographic data on all individuals. A “propensity ratio” can be created by taking the percentage of respondents to the 2014 MTC survey for a specific demographic factor and dividing that factor by the percentage of respondents for the same demographic factor in census respondents. The ratio provides the strength of the correlation between a demographic factor and transit use propensity. Ratios lower than 1.0 are more attributable to the general public than of transit users, while demographic with a ratio greater than or equal to 1.0 are more inclined to be transit users. By taking the highest ratios NVRTA can make a broad determination of where the “typical” Vine user resides. *Figure 2-30* below provides a breakdown of the demographic factors analyzed, the percentage of transit users and county residents as

a whole that fit into each factor, and the resulting propensity ratio. Ratios of 1.0 or greater are bolded, as they represent the primary factors attributable to a “typical” Vine rider.

Based on the analysis, a Vine rider is generally low income, a person of color, does not own or have access to a car, does not speak English at home, and lives with more than three workers in the same home. Individuals 65 years of age or older did not have a ratio equal to or greater than 1.0, however that group was very close at a ratio of 0.85. As Napa County becomes more aged this factor could shift closer to 1.0. For consistency only factors 1.0 or over will be used for the propensity analysis; however, where individuals 65 years of age or older reside needs to be taken into account in all future planning efforts.

Figure 2-30: Propensity Ratio Table

	2014 Transit Rider	2015 Napa County ³	Propensity Ratio
Age			
Under 18 Years Old	1.0%	16.6%	0.06
Between 18 and 65 years old	85.0%	66.9%	1.27
65 years old and older	14.0%	16.5%	0.85
Gender			
Female	47.0%	50.3%	0.93
Male	53.0%	49.8%	1.06
Household Income¹			
Under \$25,000	19.4%	15.5%	1.25
\$25,000 to \$49,999	32.4%	20.1%	1.61
\$50,000 to \$74,999	7.1%	30.2%	0.24
\$75,000 or more	7.1%	34.2%	0.21
Race²			
White	40.8%	54.2%	0.75
Black/African American	11.0%	2.0%	5.49
American Indian/Alaskan Native	4.3%	0.2%	21.55
Hispanic/Latino	35.6%	33.3%	1.07
Asian	5.4%	7.6%	0.71
Native Hawaiian/Pacific Islander	3.0%	0.2%	14.80
Zero-Car Households			
No Vehicle Available	37.2%	5.0%	7.44
Language Other Than English Spoken at Home			
Spanish	34.0%	28.5%	1.19
Other	6.3%	7.6%	0.83
Number of Workers In Household			
None	22.8%	25.7%	0.89
One Person	29.9%	34.1%	0.88
Two People	23.8%	31.1%	0.77
Three People or More	23.5%	9.1%	2.58

1 Income percentages for transit survey do not equal 100% due to individuals not electing to respond to this question.

2 Data from the American Community Surveys does not equal 100% due the inclusion of more categories in the census than the MTC survey.

3 Data for this column was taken from American Community Survey 5-year Estimate data.

2.8 PROPENSITY FOR TRANSIT USE

The five defining factors of a “typical” rider are: income level, race, vehicle availability, language spoken at home, and the number of workers in a household. Race will be a combined factor including all subcategories with a propensity ratio of 1.0 or greater. The purpose of the following analysis is to determine where in Napa County disproportionate numbers of the “typical” Vine rider reside. Using propensity ratios from the Rider Profile and census tract level data these “typical” riders can be placed geographically within the county. Scores will be assigned to each census tract using the formula below:

*% for demographic factor x
propensity ratio for demographic factor*

Once the formula has been applied to all five factors it will be multiplied by the population density of each census tract resulting in the “final score”. This final step provides a more general determination of transit use propensity; as population density is a known factor in determining an orientation towards transit use. The final scores will be separated at natural break points creating five categories: very high, high, moderate, low, and very low. The maps in *Figures 2-31, 2-32, and 2-33* are the result of this analysis, depicting where the highest concentrations of the “typical” Vine rider resides within Napa County.

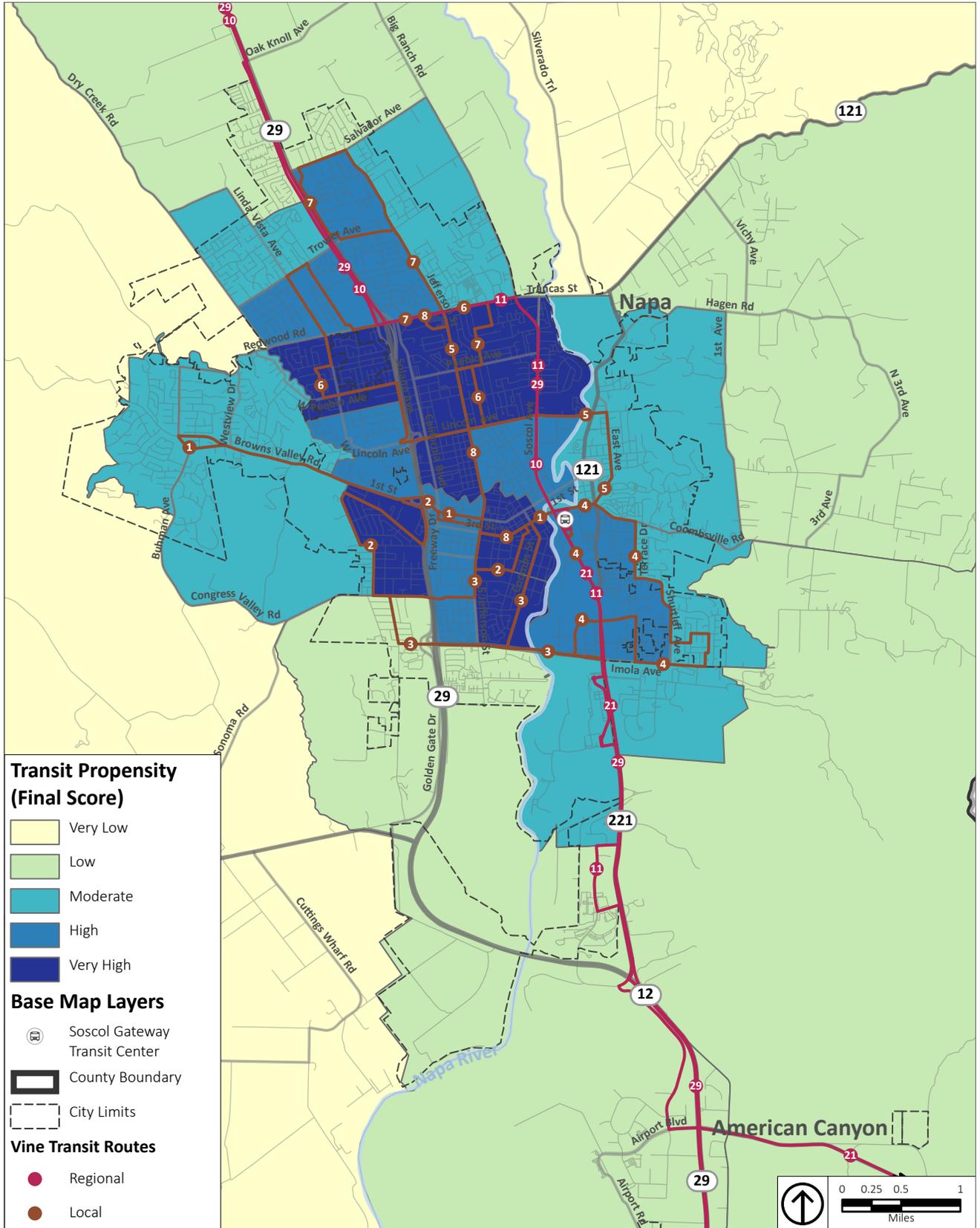


Figure 2-31: City of Napa Transit Propensity Map

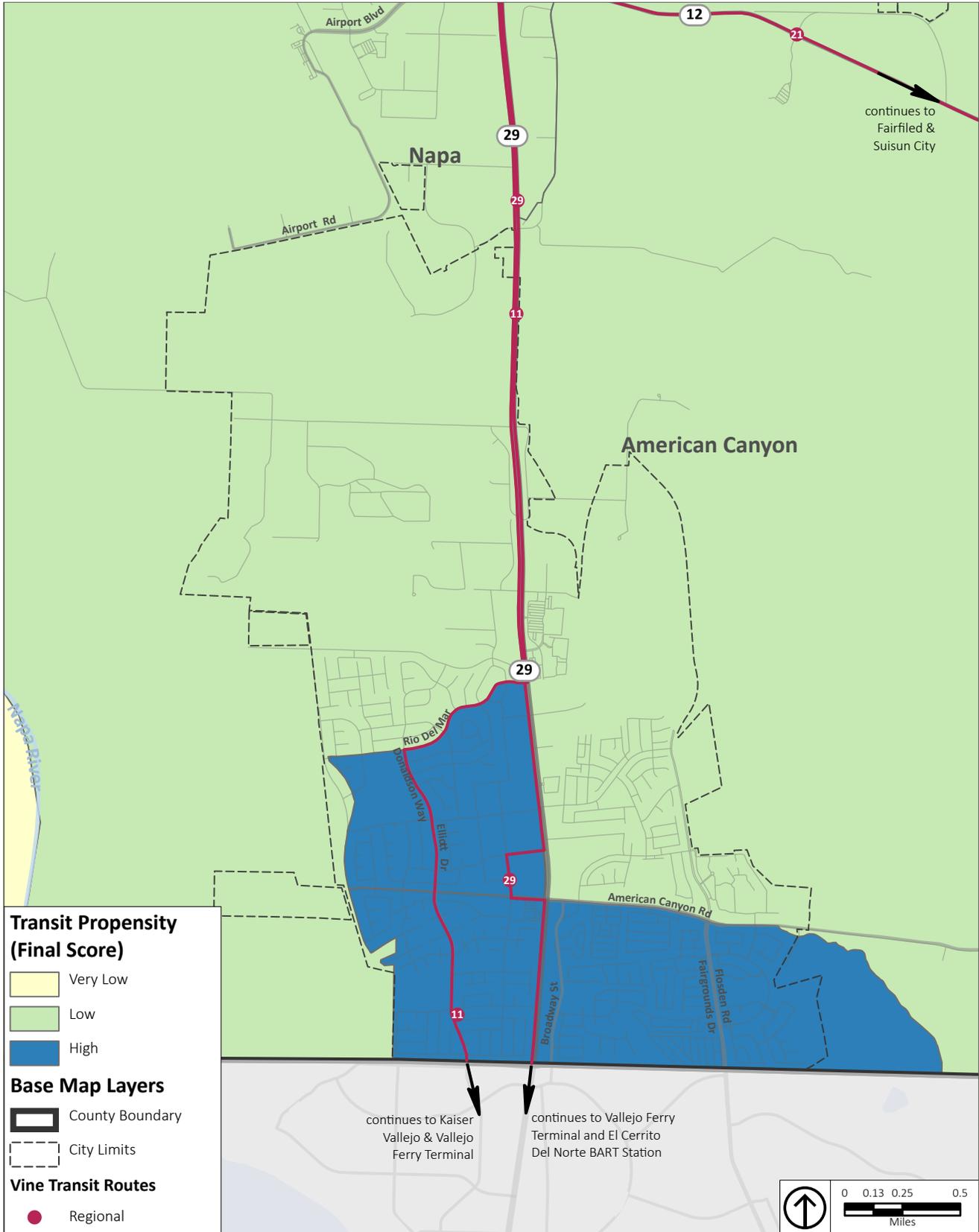


Figure 2-32: City of American Canyon Transit Propensity Map

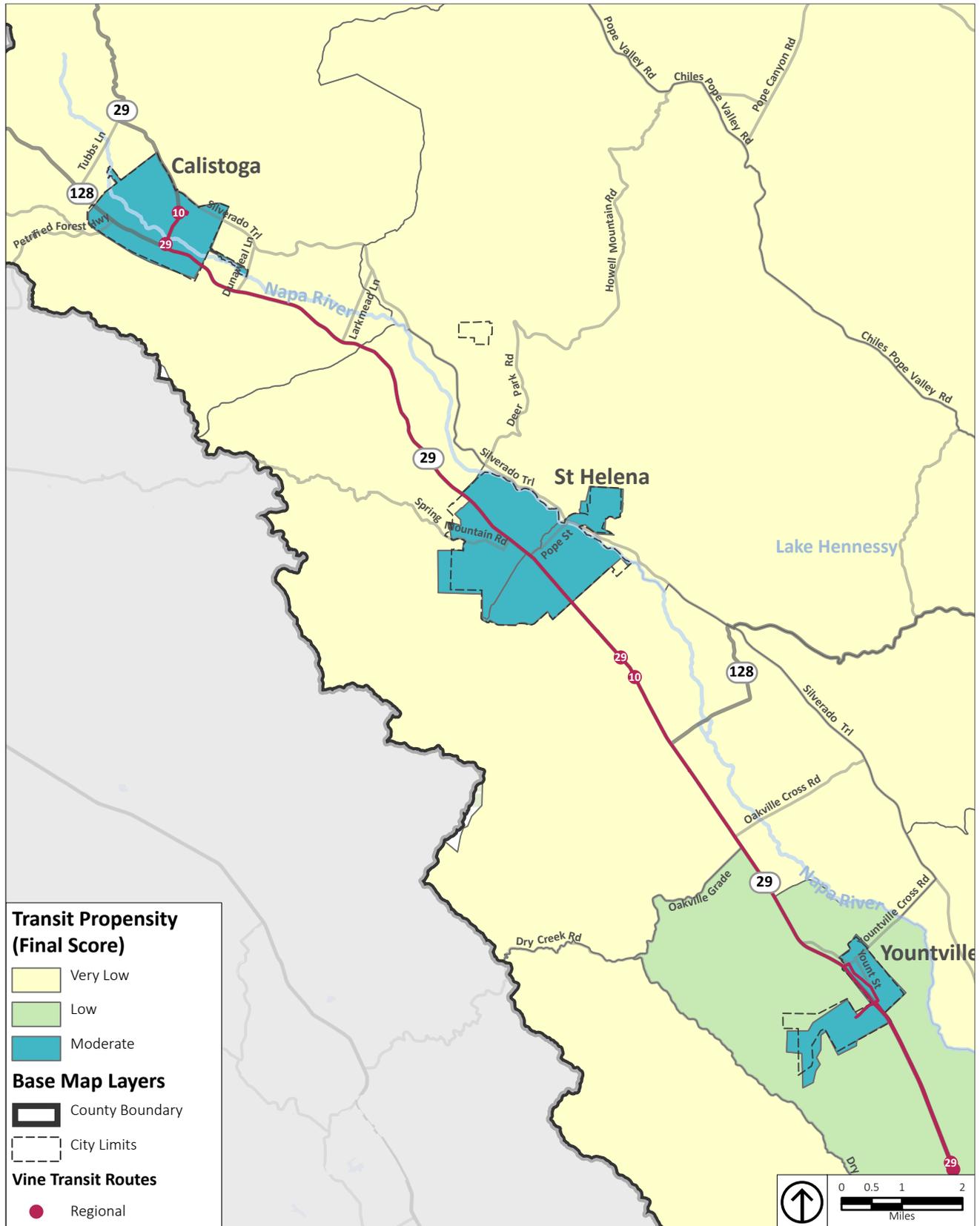


Figure 2-33: Up Valley Transit Propensity Map

The highest concentrations of transit propensity are located within the City of Napa with a small concentration in the southeast part of American Canyon (Figures 2-31 and 2-32). The concentrations in the City of Napa are clustered along major corridors. This concentration bodes well for future route planning. Service could be deployed in a linear manner as opposed to the loops currently operated. Areas of medium-low propensity in the northeast and west of the city may benefit from on-demand service as opposed to traditional fixed route. Future planning efforts should focus on connecting areas of high transit propensity to locations with major trips generators e.g. employment centers, food, and medical.

2.9 TRANSIT DEMAND INDEX

The propensity analysis pinpoints specific attributes of a typical transit rider in Napa County. Focusing on these populations should help build ridership. Employment and population densities can also be used as determining factors of transit demand. These two factors can be used to create a “transit demand index” which details the level of service warranted in specific areas of the Vine transit system. The “Transit Capacity and Quality of Service 3rd Edition” Manual produced by the Transit Cooperative Research Program (TCRP) contains standards for level of service based of residential and commercial densities. These standards can be seen in Figure 2-34. In the City of Napa, where employment and residential densities are the highest in the Vine service area, there are

very few areas with enough density to support thirty minute service frequencies, a standard included in the report. The commercial and residential densities that do support more frequent service are also not on a contiguous corridor creating segmented pockets of demand. These segmented pockets of demand can make it difficult to support transit along specific corridors.

The TCRP report referenced above noted that population density has a double effect on demand for transit service. A person is more likely to use transit when they live in a dense area. There are generally more people within walking distance of transit service as density increases. It is plausible to assume that a person living in a higher-density area is twice as likely to use transit for a given trip as person living in a lower-density area. The same assumption can also be applied to concentrations of employment; however, that assumption is predicated on other factors like where employees live and parking constraints.

Unfortunately for the City of Napa, and the County of Napa as a whole, there are very few areas that could be considered “high-density”. This does not mean that NVRTA should follow the findings of the aforementioned report and institute blanket cuts to frequency across the system. However it does suggest that NVRTA evaluate the feasibility of deploying alternatives to traditional fixed route service to maintain its current coverage. As NVRTA moves forward with the planning process the use of a “transit demand index” should be used as a broad stroke for allocating service.

Figure 2-34: Service Level by Residential and Commercial Densities

Service Level	Minimum Residential Density	Minimum Commercial Density
Local Bus, 1 bus per Hour	4.5 dwelling units/ net acre	5-8 million square feet
Local Bus, 2 bus per Hour	7 dwelling units/ net acre	8-20 million square feet
Local Bus, 6 bus per Hour	15 dwelling units/ net acre	20-50 million square feet



6.

Conclusion

Napa County presents a unique challenge to serve with transit. The future planning process will focus on allocating resources to major corridors, during the times of day when people travel most, and to the populations that show the most demand for transit. NVRTA will need to evaluate mobility alternatives for areas of the City of Napa that do not support traditional fixed route transit service. On-demand services might be more appropriate in these areas, specifically moving people from their homes to commuter service. A Technical Assessment will be released in tandem with this document. It will provide further understanding about where transit is currently operating efficiently and where operational changes should be recommended.



NAPA Valley Transportation Authority