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NAPA

Transportation Amid Changing Times

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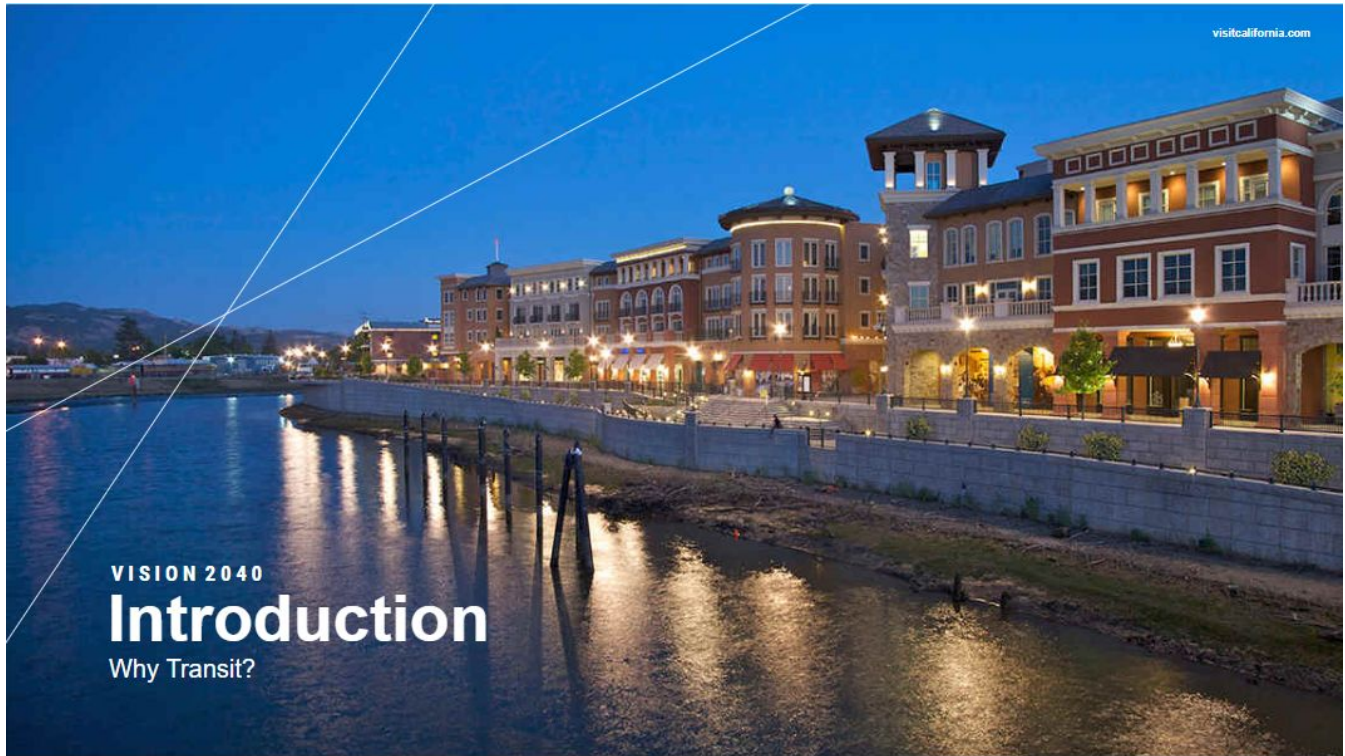
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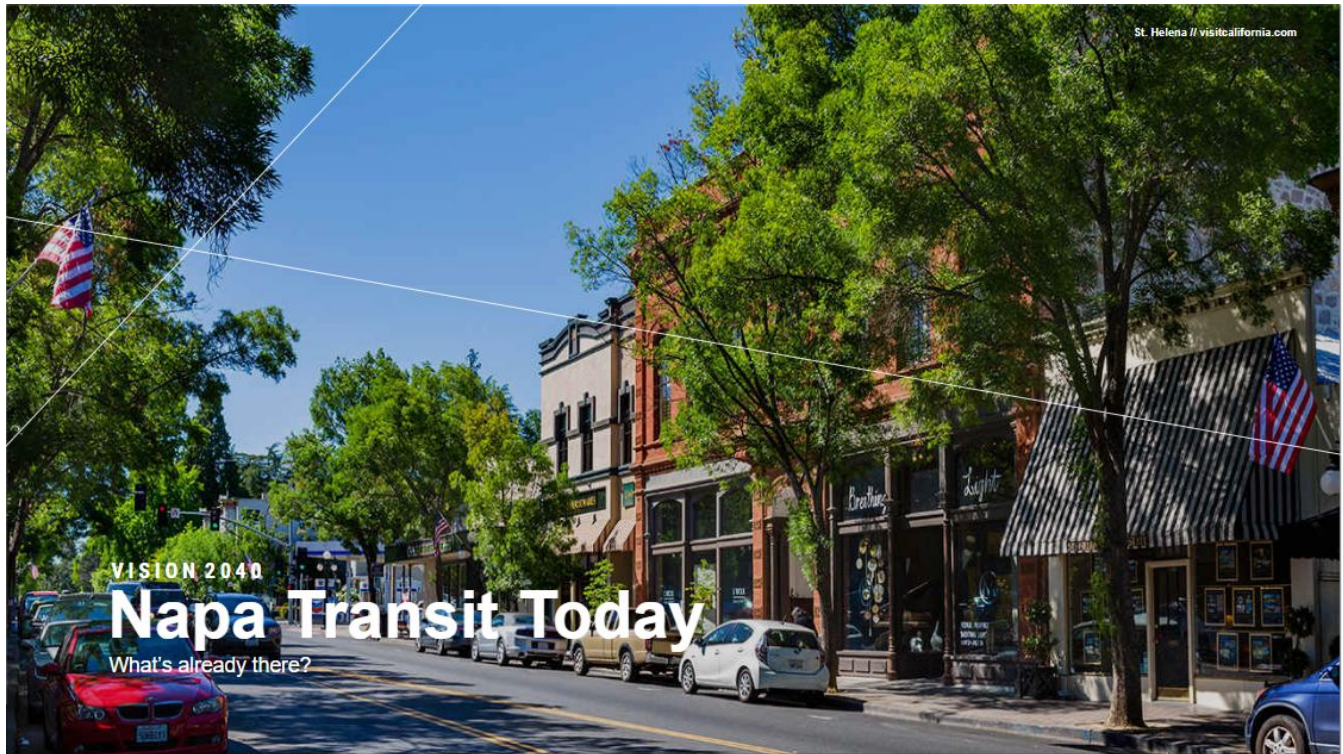
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Napa is the largest and most populous city located in Napa County with over one hundred thousand people who call it home. Napa's current density, 4,500 people per square mile, does not rival that of its larger neighbors in the Bay Area. However, the city is actively working on densifying, particularly in areas such as its downtown core and revitalizing its commercial districts. Currently, Napa is served by Vine Transit, Napa county's transportation agency of which eight local routes serve the city and four regional routes connect Napa to the greater county area and Bay Area (The Vine).

The existing system of local routes on Vine Transit make it difficult for users to traverse the city without needing to transfer multiple times on bus routes. In order to travel through Jefferson Avenue, a key commercial corridor in the city, one must transfer across three bus routes that are disconnected and offer no convenient transfer points. The current system also utilizes a system of local loop lines that provide local service to small, residential neighborhoods. However, these lines have extremely limited service—one bus an hour—and are operated only in one direction, making them extremely inconvenient for users. Other key areas of the city not currently served by transit include Main Street, an extension of Napa's Downtown District, Alston Park, a 157-acre recreational park, and Pueblo Avenue (Alston Park). **Current conditions mean that it is virtually impossible to live in the area without access to a personal vehicle.**



The Napa Valley Transit Association has already begun to gather data on the public's desires for the existing system through hiring Kimley-Horn and Associates, an engineering and design consulting firm. When analyzing the transit user survey conducted by Kimley and Horn, 74% of respondents cited frequency and lack of transfer points as the main factor that barred them from utilizing Vine Transit buses. This was followed by 69% who cited longer trip times as the second main deterrent (Kimley-Horn and Associates, 2017). USA Today reports that gas prices are projected to get cheaper bolstered by a strong economy, increasing the incentives to drive as opposed to utilizing transit (Brown). In addition, the California Department of Motor Vehicles (DMV) semiannual statistics show that in two months' time, the number of registered automobiles increased by 4,104 in Napa County from October 2018 to January 2019 (DMV). As it becomes cheaper and easier to drive, **public transportation must improve in order to provide legitimate competition for automobiles and present itself as a viable alternative.**

Napa's current high car dependency results in a number of equity problems—the main issue being that car dependence disproportionately impacts those with lower socioeconomic status. Purchasing and repairing automobiles, and the added gas and insurance costs that they bring represent huge barriers to entry in car ownership. To

own a car, one must be financially stable. Another issue lies in pollution. While wealthier citizens can afford air purifiers and can afford to purchase homes away from car-centric areas, lower income citizens do not have that luxury. Living near highways and other heavy traffic areas have been known to increase rates of asthma and breathing problems. Finally, reducing greenhouse gas emissions from vehicles is also important in meeting climate change goals.

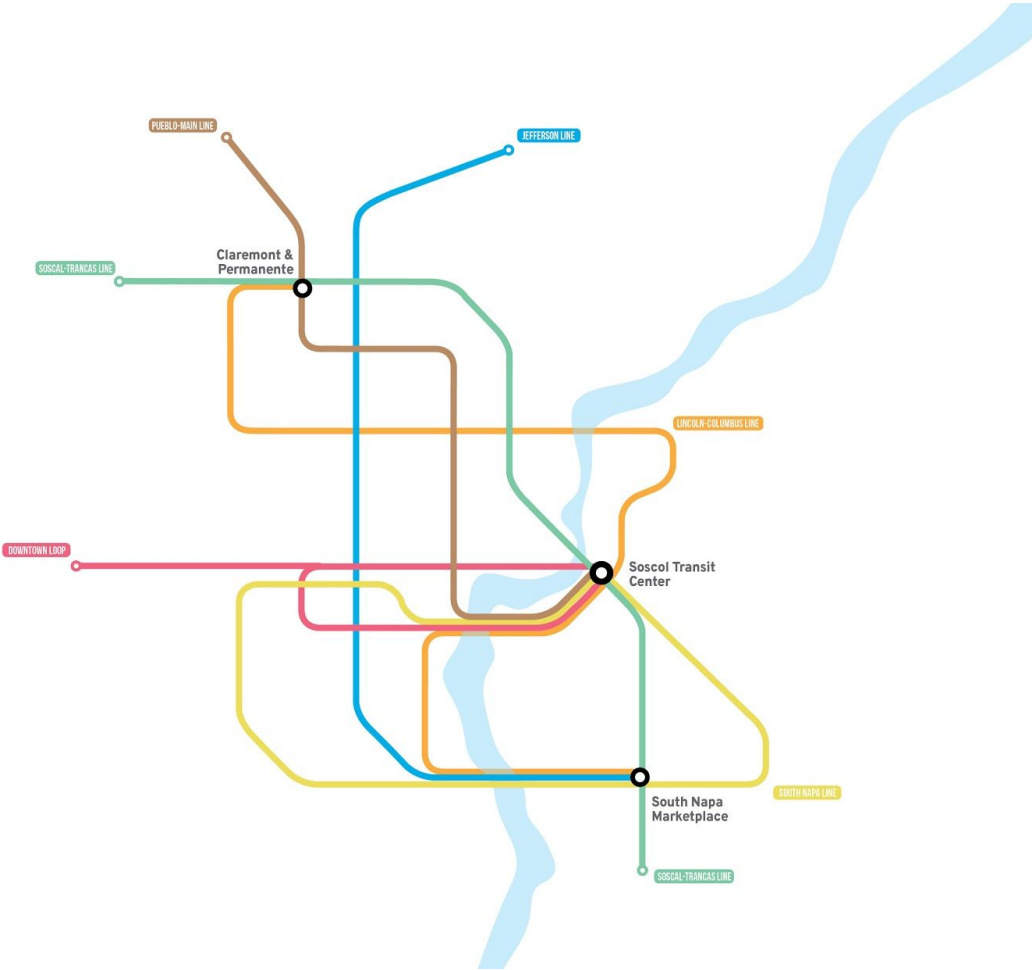
The effects rising car ownership in Napa can be directly seen in its public transit ridership. From 2016-2017, ridership on Vine Transit fell from 1.2 to a little over 1 million in 2017-2018. In response to these criticisms, Napa Valley Transit Authority is in the midst of conducting a study to reroute their existing bus network in an effort to better capture ridership. Their goals include eliminating “looping routes within the city of Napa” in favor of “more direct, out-and-back routes. Bus routes would terminate at points that are frequented by the public and would function as destinations themselves. Overall, NVRTA Program Manager Matthew Wilcox is working to bring more frequent service to areas, fulfilling the disparities outlined by the citizens, but at the expense of local services in certain areas.

Vine Transit buses as they are today are infrequent, unreliable, and therefore, inaccessible to many of the residents of Napa. The Metropolitan Council of Minneapolis recommends a density of 15-60+ dwellings per acre for local BRT routes or high-frequency bus routes (Local Planning). When analyzing the Census Tracts of Napa, Napa’s downtown core and surrounding areas far exceed these minimum densities (Census). Given this information, we believe the Napa’s current transportation system is inadequate and fails to attract the ridership that it could potentially capture. This is exacerbated by the fact that Napa is a popular tourist destination with many hotels being located in the downtown core-- over 3.85 million people made their way into the greater valley region in 2018 (Alston Park). These tourists can also benefit from utilizing transit to move around the city and explore the historic downtown.



In our proposed solution, bus routes are reconfigured to run primarily on key corridors instead of crisscrossing the city across many streets. This will help with identification and the ease of the system— lines that primarily focus on key corridors within the city will give users a better idea of where and how they are getting to their destination (Nikitas & Karlsson, 2015). In compliance with the NVTA’s vision, we have also outlined the implementation of two secondary transit hubs that serve to supplement the existing Soscol Hub. These secondary hubs will concentrate transit services in the north (Claremont and Permanente) and south (South Napa Market) of the city, and expand the access to transit services by streamlining routes and taking advantage of commercial hubs to concentrate transfer points. In the short term, we envision Soscol, Claremont, and Permanente, and South Napa to become park and ride centers as these locations already have ample amounts of parking. These three hubs are destinations in themselves, as they are already major commercial locations and are located near tourist attractions and various parks. Through this proposal, we are seeking to combat the statement that Vine’s Vision report makes— “For local trips in the city of Napa, the Vine cannot compete with a car in directness and flexibility”. **Our vision is to make public transportation the obvious choice for trips within the City of Napa.**

We also propose looking towards increasing capacity and frequency on trans-city bus lines. Napa currently supports four such routes: route 29 which connects the city with the El Cerrito BART station, 21 which heads to the Fairfield AMTRAK station, the 10 which goes to Saint Helena, and the 11 which terminates at the Vallejo Ferry station. These lines support the burgeoning commuting culture of which Kimley and Horn's survey indicate that nearly 43% of Napa residents commute to St. Helena daily and 21% to Bay Area cities San Francisco, Berkeley, and Oakland. This would require communicating with CalTrans, California's highway operator, to implement dedicated bus lanes and other solutions which would reduce the effect of congestion on bus travel times. Vine Transit currently is looking towards regulation that would make it legal for buses to use right-most shoulder lanes to bypass traffic.





Current Issues

As written by Ron Miller in “The Importance of People’s Participation in Planning,’ He states that a common characteristic in planning is one that ‘recognizes the importance of citizen involvement” (Miller, 2000). The online survey found that 28% were unaware of Vine Transit bus services (Kimley-Horn and Associates, 2017). As mentioned previously, the survey also outline ”frequency” and “ease of transfer” as two main improvement points that Vine Transit can make.

This presents a number of issues that the transit system needs to improve. First, over a quarter of residents were unaware of the opportunity. Thus, these individuals relied on personal vehicles for their mobility or may have had to rely on others which would significantly affect their mobility. The other issues fall into the category of convenience. As previously noted, cars are generally the most time-efficient way to get around Napa. Therefore, in order to make a bus system effective, it needs to become a legitimate rival to traveling in a personal vehicle.

Another issue with buses is that they often have negative associations in the United States. Amanda Hess quotes bus rider Jaqueline Carr in her article, "Race, Class, and the Stigma of Riding the Bus in America," saying that "there's a social understanding and a construction around that if you take the bus, you take it because you don't have money" (Hess, 2012). Bus De-stigmatization is an important part of increasing ridership.

System Upgrades

There are a number of ways the issues surrounding the ease of using the bus system can be improved through system upgrades. In using the proposed streamlined routes, the reduced number of routes allows for higher frequency of buses on existing corridors. Currently, most routes support one bus every hour which can be highly inconvenient for transit users.

While this is no doubt an issue, improving the speed of buses is also an important way to reduce wait times. One solution is the implementation of rapid lines, particularly during commute hours. Another tool is signal prioritization, which allows buses to spend less time at red lights. Alameda County (AC) Transit implemented both of these tools on 1R lines and was able to cut down on transit time because of the reduced number of stops as well as the reduced stoplight wait times (AC Transit Rapid, 2009).

Signal prioritization can also be used on non-rapid lines. As susceptibility to traffic congestion decreases, it will be more possible to implement timed transfers. Transfer wait times also improve with general bus frequency, so all of the stated improvements would benefit users who require multiple lines to reach their destinations.

Another solution would be to create a comprehensive app. Vine Transit supports two mobile apps to pay for bus travel, another app for its routes, and real-time bus locations are provided by an outside, third party app known as the Transit App. The lack of an application that combines all three features is frustrating for transit users. Creating a comprehensive tool would improve upon the user experience of taking Vine Transit and such changes will make bus tracking and journey planning significantly less complicated and more convenient.

Clearly, awareness about The Vine can be improved upon. While it is essential to advertise to the entire community, it may be especially beneficial to connect with groups for whom public transportation is an important resource. Banner areas that are being reconstructed such as raised platforms could both inform the public of both the reason

for the disruption and the improvement and existence of the transit system. Furthermore, more prominent infrastructure and installation of public art in stations will help accomplish this goal.

Another important element of maintaining a well-run transit system is making sure that it is sufficiently staffed. One way to ensure this is to connect with high school career counselors about Napa Valley Transit Association careers about options available to high school graduates. Reaching out to local schools is also a great way to build awareness about Vine Transit. Children who are educated about these resources early on would be more likely to utilize them in the future as adults.

Infrastructure Improvements

As noted, infrastructure improvements have the ability to raise the profile of the transit system, however, they also provide concrete benefits. One example of an infrastructure improvement would be elevated platforms. They enable people with strollers, wheelchairs, and anyone who struggles with climbing stairs to board and disembark more easily. This reduces the amount of time a bus needs to spend at each stop. This technique has been proven successful through Boston's Everett BRT which stated that the addition "(sped) up commutes for the 10,000 riders on Broadway" ("Bus Platforms," 2018).

Infrastructure improvements can also improve the customers' experience waiting for the bus. By providing sheltered and enclosed bus stations, riders would be protected from extreme weather conditions. It would also be an added benefit if these bus shelters were fully enclosed with air filters in them, allowing them to serve as an initial point of evacuation for those who rely on The Vine services to evacuate the area without being exposed to dangerous particulate matter in the air. This would make bus travel more accessible as commuters will be shielded from extreme cold or hot temperatures. A fully enclosed bus station design was introduced in Dubai, where it provided commuters with a waiting area that was air-conditioned ("Air-conditioned Bus Shelters," 2018) -- allowing them to seek shelter and avoid the sweltering sun outside.

There are also important steps that can be taken to reduce the environmental impact of this system. Many transit systems have used electric vehicles to reduce the greenhouse gas emissions of their fleet. There can also be economic benefits of using electric vehicles. The city of Wichita was recently the first city in Kansas to turn to the use of electric vehicles. The use of these vehicles also helped reduce operation costs for

transit companies. Wichita Transit Director Mike Tann stated that, “the buses save \$300,000 on fuel and \$150,000 on maintenance over the course of their lifetimes compared to the current diesel models” (Faulx, 2019). Additionally, he was also hopeful that such a decision would be “a reason why people choose to use public transportation”. A current limitation with this proposal is that Pacific Gas and Electric, which provides power for the City of Napa has recently had a number of extended power outages. Considering Napa is looking towards implementing microgrids in the future, such an implementation would also decrease Vine Transit’s vulnerability to power outages should the current bus fleet be converted into electric vehicles.

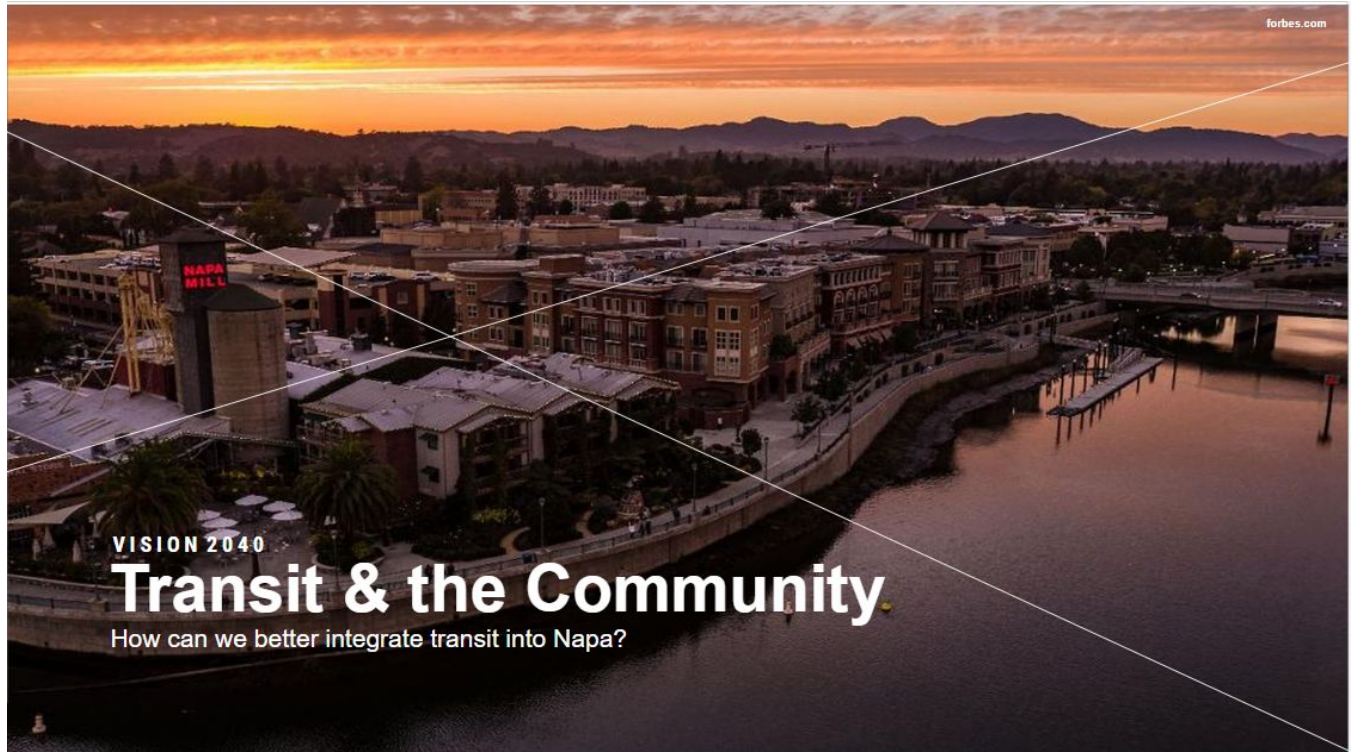
Combined Infrastructure and System Changes

The changes in the following section require upgrades to physical infrastructure as well as technological support. The first of these proposed additions is screens or other displays which indicate the arrival estimates of buses at that stop. This makes it easier for customers to make choices because they have access to more information. It also has the benefit of providing this information to riders who do not have a smartphone or mobile device capable of using an app.

This was widely adopted in the city of Singapore and has since become an important feature of the transit system. In an article written by Ursa Primozic, she states that Singapore can “now help its ridership through real-time arrival information displayed on electronic screens” (Primozic, 2016) She goes on to explain that this addition also benefited public transport operators as it allowed them “to take proactive control of their fleets, lowering operating expenses and providing a better service, retaining passengers”. While it is not covered in our plan, the use of data to improve bus service is an important part of making this system effective.

One of the easiest to implement changes is the addition of dual door boarding. Passengers are able to use both doors which reduces loading time. It also means that standing riders are not constantly required to shift to the back of the bus to allow new riders to board. This has proven to have caused significant delays in the departure of the bus (Jaffe, 2015). It also allows riders to exit through the door closest to them, which is not always the rear door. Making sure riders are aware that those disembarking should do so before new riders get on is an important element of making this system function smoothly. While it is a fairly minimal change, it does require changing rider behavior so that enough riders have cash-free payment methods and that they are aware that they can board through the rear doors.

Another technological and physical improvement found in many bus rapid transit systems or improved bus systems are designated bus lanes and priority lanes (Agrawal, Goldman, & Hannaford, 2012). This would make traffic flow for buses more predictable and less erratic thus making it more reliable. A city that has heavily enforced such a policy is that of Seoul, South Korea (Furillo, 2018). The addition of a bus-only lane in wider three-lane streets could also be essential in aiding to the predictability of bus arrivals as they will also not be affected by privately-owned car congestions. Similarly, one could also have bus specific traffic lights, meaning that buses will not be affected by congestion caused by privately owned cars on the roads. The use of Transit Signal Priority would be beneficial in ensuring the punctuality of buses. According to, Transit Signal Priority (TSP): A Planning and Implementation Handbook, TSP is defined as ‘an operational strategy that facilitates the movement of transit vehicles (usually those in-service), either buses or streetcars, through traffic-signal controlled intersections’ (Smith, Hemily, & Ivanovic, 2005) The handbook also states that the use of TSP “include improved schedule adherence and improved transit travel time efficiency while minimizing impacts to normal traffic operations.” Hence making it a strategy that is minimally invasive to other modes of transportation. Similarly, the use of TSP has been said to “help make transit service more reliable, faster, and more cost-effective”, and because of this is a very plausible strategy in assuring a bus’s punctuality.



Several aspects of Napa’s current transportation system could be improved in order to better the spatial and economic interactions between transit and the wider city. Transit can be used to connect students to their schools. Additionally, increasing density development along bus corridors, and evaluating key solutions to the first-mile last-mile problem can help existing transit services engrain themselves within the communities they strive to serve.

Educational Organizations

Napa is home to Napa Valley College, a branch of the California Community College system, and educates more than 6,700 students yearly. It is the only community college in Napa and provides an important step in higher education for citizens that are not yet willing to attend a university or don’t yet have the financial stability to do so. Almost 29% of University of California (UC) graduates and 51% of California State University (Cal State) graduates transferred from a community college and almost half of all UC STEM degree graduates did so as well (Key). Individuals with a university degree earn, on average, \$32,000 than their counterparts with only high school diplomas (How does). Napa Valley College provides this key service to the citizens of Napa, but despite this,

the institution offers no substantial incentive or discounts for its students to take local transit to school or to use local transit in the area. Considering the college is located at the southernmost point of the city, its non-central location makes it difficult to access without automobile use. Free transit passes, paid as an additional cost to students' tuition, or discount tickets sold by the school can encourage more students to ride buses and avoid automobiles on their way to school. Student discounts can entice commuting students from nearby cities to shift to transit use. Similarly, regional bus routes that connect Napa with higher education institutions in Solano, Vallejo, and the Bay Area can benefit from this as well.

In terms of local service, the Napa Unified School District offers some bus service for students to get to and from school. However, these buses run only once in the morning, and once in the afternoon. This is not equitable for students that must stay later in the afternoon for school commitments, or cannot adjust their schedule to the strictly timed bus routes offered. Vine Transit could be used as a way to bridge this gap. In the mornings and afternoons near school starting and ending times, students that show school ID's could be offered free transit on buses. This idea is currently in use in Sacramento, which is testing the RydeFreeRT program for students in K-12 schools. Eligible applicants receive a sticker to affix onto their student ID cards which grants them access to Sacramento's bus and light rail system for a year (Student). Elsewhere, school bus services are directly integrated into transit agencies within cities. AC Transit in Berkeley offers the 604, 605, and 688 routes to serve elementary, middle, and high school students across the city.

Transit-Oriented Development

Another important factor to consider is transit-oriented development. Exploring ways to densify Napa's existing corridors is key to ensuring high ridership numbers— where it is convenient, riders will utilize the service. The Vine Vision Plan outlines the city's focus on concentrating dense development along the Soscol, Trancas, and Jefferson which are incidentally the corridors we are looking to consolidate bus traffic on. We also identify the Soscol Transit Center as a key site for development. Although it is just across the river from downtown, the census tract containing the center stands at 4,761 people per square mile. This is a huge disparity when comparing census tracts in the rest of downtown Napa, which averages to 7174 people per square mile (Census). The current center is surrounded by industrial complexes and a myriad of empty lots. This can be better utilized and help to bring density to the area, possibly expanding the downtown hub to areas across the river.

At the same time, it is absolutely necessary to preserve trailer parks and mobile home parks within the city. These areas offer critical housing locations for middle to low-income residents as well as seasonal winery workers. Napa should provide incentives for the owners of these properties to avoid razing them to construct new, gentrifying housing or sell them to developers. City laws banning development on these key sites would be helpful in preserving their key functions.

Strategies to combat gentrification would involve focusing on densifying the downtown area. Currently, an entire five blocks of downtown are allocated to vehicle parking, even with the presence of a multi-story parking garage. There is still a lot of room in the downtown district for Napa to grow, expand, and transition away from car dependence. While unpopular, parking restrictions and the removal of curbside parking in the downtown area can also help to discourage driving and concentrate automobile parking into the existing parking garages and lots (Garthwaite). Additionally, the National Transportation Safety Board reports that buses that must navigate to curbside stops face a collision risk that is seven times greater than other vehicles (NTSB). Eliminating parking along these downtown bus corridors would also benefit Vine Transit.

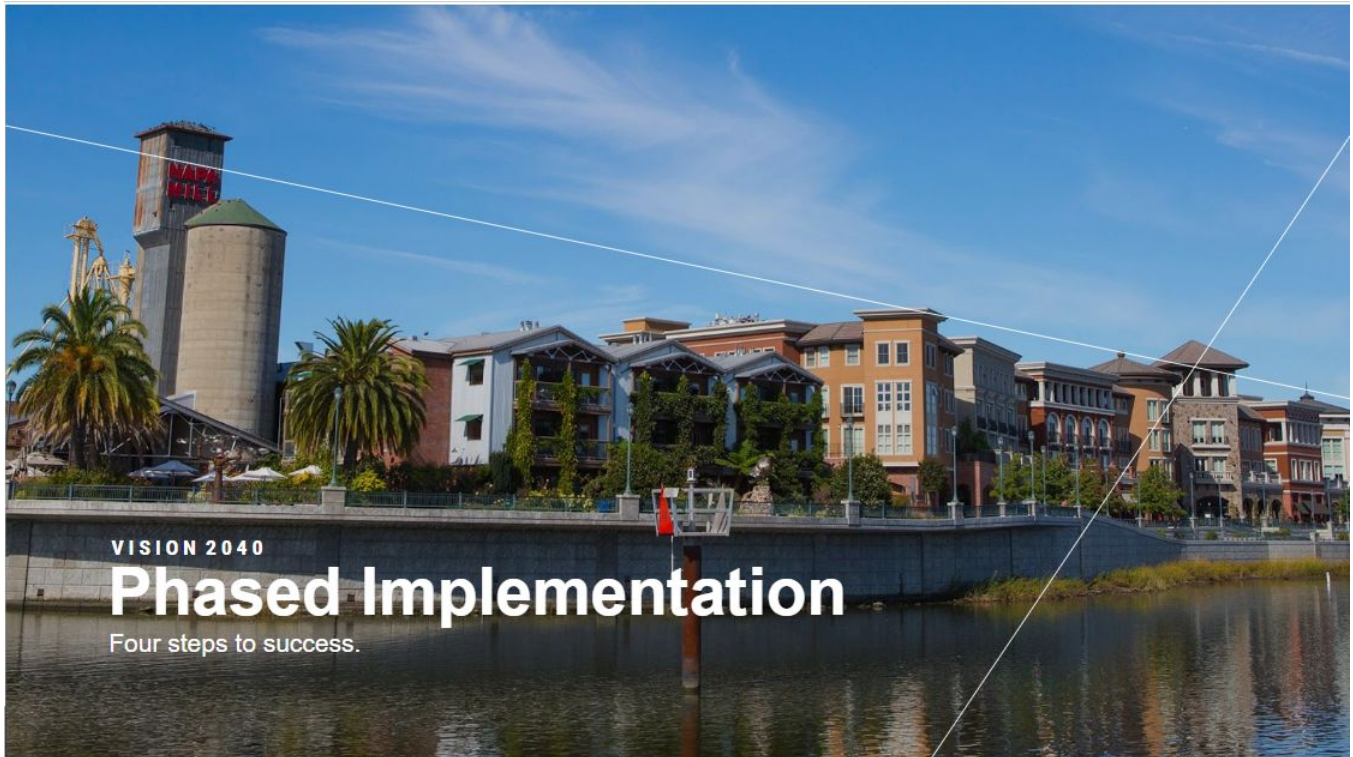
Another challenge to density involves building costs. The Napa metro area faces high costs compared to the locality's rent projections. The use of modular housing and prefabricated unit constructions would help greatly in reducing per-unit costs and open up opportunities for developers to be more enthusiastic in constructing affordable housing.

First Mile Last Mile

Connecting outlying areas and neighborhoods along key transit routes is also key to ensuring a functional transit system. Although transportation network companies Uber and Lyft are not ideal in terms of replacing local public transit, they can be fantastic ways for citizens to get to and from bus stations from their destinations. Partnering with Uber and Lyft to offer reduced fares when traveling to and from bus stations and creating designated pickup and dropoff points near bus stations can help to incentivize this service. Additionally increasing awareness of existing programs is key.

Expanding the city's current bike-share program and making it accessible to all residents can help bring transit stops closer to their range. Implementing curb protected bike lanes helps to increase biker safety (Higashide, 2018). 64% of people surveyed by UK's Department of Transportation believed that it was highly dangerous to cycle within

urban areas. As the UK's biking infrastructure is similar to America's it is likely this same concern exists within cyclers in our own countries. Expansion of bike racks and bike infrastructure on buses would also encourage citizens to use bikes regularly.



Because Napa is currently highly car-dependent (“Transit, Transportation & Getting Around,” n.d.), it is unreasonable to expect that the immediate development of a bus rapid transit network would be well received. Thus, we propose that changes to the current public transit be implemented in stages. These stages are broadly concerned with gaining public support, basic infrastructure and system changes, more advanced infrastructure and system changes with the goal of making public transit an identifiable city feature, and finally, implementing final elements of a traditional bus rapid transit system and connecting Napa with other areas.

Phase One: Communicate with the Community

The first phase is intended to create community support. This is important to improve ridership numbers and maintain public good will towards the project even for those who may not be using the system themselves. We propose two elements of this process; communicating the need for improved public transit and communicating with individuals and organizations that may have an interest in the improved transit system.

There are a number of benefits which must be explained. One of the obvious benefits of improved public transportation is the reduction in traffic, especially during commute hours. This benefits both locals and tourists. Current congestion levels are a serious issue (Huyghe, 2016.). Another way to promote these improvements is to help encourage higher density development, especially along these routes. Improved transit may lower the necessary number of parking spaces per unit which can add considerable expense to the project. There are also less direct reasons to improve public transit. For example, Napa has a high rate of DUIs. In 2015, it had around 950 arrests. Los Angeles County had around 37,500, around forty times the number in Napa (Oulad Daoud & Tashima, n.d.). However, Napa's most recent population estimate was approximately ("U.S. Census Bureau QuickFacts," n.d.) 140,000 and Los Angeles' population was most recently estimated at over ten million ("U.S. Census Bureau QuickFacts," 2019), over seventy times higher. Providing easy transportation for those individuals can make the roads safer for everyone.

The second step is to publicize the system improvements to the community. One of the issues with the current system is the lack of public awareness, particularly of express routes, that might attract more commuters. Next, especially because of the limited school bus services, communicating with schools and students about taking the bus is important ("Transportation," n.d.). High schools would be a strategic place to start because many students are not old enough to drive but are interested in traveling independently. Furthermore, Napa has an aging population (*California Aging*, n.d.). Driving can be difficult for older people for any number of reasons. Providing transit they can access helps people remain connected with their communities while they remain in their homes. Finally, this step includes reaching out to hotels and travel guides so that they can inform their customers about transportation possibilities in Napa. **The goal of this stage is to make sure that changes and improvements to the transit system are well received by the community to increase future ridership.**

Phase Two: Initial Changes

The first system changes we propose are those that require minimal changes to infrastructure while increasing system efficiency to allow more frequent buses which is one of the determining factors of ridership. The biggest change is the introduction of the proposed streamlined routes. Implementing two-door boarding procedures can be accomplished within a year. As outlined above, it requires only minimal new materials in the form of added ticket readers, but does not require changing the fleet or renovating bus stops.

There also needs to be support for existing programs such as the Travel Training Program where volunteers show people how to use public transit. It is also important to advertise existing tools such as the trip planner feature on the website. Furthermore, services such as the St. Helena shuttle which allows tourists to explore the area without a car should be promoted. **The goal of this stage is to improve the experience for existing riders and attract new riders who are interested in using public transportation.**

Phase Three: Make it a Feature

Transit systems are often integral to the function of cities, but many cities's systems are not only functional but iconic. Visiting London or New York, it is not uncommon to see visitors taking pictures in stations with maps or system logos. Building on Napa's existing popularity as a travel destination, an improved bus network can become another feature which supports tourism.

What makes famous transit systems iconic are their functionality and aesthetics. The functionality will be improved by the efficiency changes proposed in phase two. However, the waiting experience also needs to be improved. First, we propose building elevated bus bump-outs that allow the bus to avoid pulling over and makes boarding, particularly for those with mobility issues, much easier. It also has the advantage of making the bus system much more visible. On these raised platforms, bus shelters should have design features which are cohesive with Napa's current and historical design aesthetics. Displaying bus arrival predictions is an essential part of encouraging ridership through improved experience. They will provide shade for hot days and a windbreak on cool days makes the waiting experience better. San Francisco's MUNI system conducted a study on the benefits of displaying arrival times and found that they could be quite helpful for improving ridership (*Customer Information*, 2018). Furthermore, introducing clear lighting at night is an important part of improving safety, and perceived safety (Peña-García, Hurtado, & Aguilar-Luzón, 2015), and thus ridership. While these require construction, it is possible to do this in stages, such as initially widening sidewalks and later adding raised platforms.

Elements such as trees near transit stops can improve the aesthetics of the system. Public art, which is already an important part of the city, can also play a role in the bus shelters in either rotating or more permanent forms such as Portland's sandblasted bus shelters created by local artists ("Bus Shelter Art," n.d.). There are also less

conventional adaptations that can be explored. For example, Utrecht in the Netherlands uses the roofs of their bus shelters to provide habitat for bees (“Bee Shelters,” n.d.). Pollinators are vital for the vineyards which surround much of the city and also make the city more friendly to wildlife.

It is important to improve the experience of riding the bus as well. This has practical elements and design elements. Informing riders using both audio announcements and visuals not only serves vision or hearing impaired riders but it also helps riders who are unfamiliar with the system. Including the names of popular locations along with or in the stop name can also be helpful. Many MUNI drivers announce Alamo Square (the park which has the Painted Ladies) as well at the Department of Motor Vehicles because it helps riders know when to get off and can reduce the number of questions a driver is asked while driving either by locals who are taking an unfamiliar route or by tourists. Maintaining roads used by buses makes the ride significantly more comfortable. Creating an iconic and cohesive design vocabulary for the system makes it feel more solid and complete. For example, consistent branding and colors throughout the fleet and bus stops can make the system feel cohesive. Some transit systems even have more detailed consistencies such as an iconic seat upholstery fabric (O’Sullivan, 2019)

In terms of interior design, the design of the bus must be clean and comfortable. Including advertisements for local events, especially those which are accessible by the transit system, increase community interest in these events as well as something to engage passengers on the bus. Another important issue is ensuring that the cellular data signal is strong along the bus routes. This allows riders to stream entertainment or stay connected to work (“Wireless Connections | bart.gov,” n.d.), and may make it more a more attractive option than driving for some potential customers

The final element of this stage is improving understanding of the system. This includes making tickets, Clipper Cards, and system maps easy to purchase and highly visible at local stores. It also means continued public outreach about who is eligible for reduced fares and making sure that these programs are accessible to the people who rely on them. Advertising campaigns should mention Napa’s transit system and visitor centers should point tourists toward this resource. Transit availability should be communicated to tourists before they arrive so that they have planned a car-free or car minimal trip. Including the information on travel information websites ensures that potential visitors know about the transit system without having to seek out the information themselves. It is also essential that hotel staff are aware of how the system works so that they are able to readily supply guests with this information. **Ultimately, the goal is to make transportation become part of the culture of Napa.**

Phase Four: Maximum Efficiency and Future Innovation

The Vine transit system played an award winning role in evacuating Napa Country residents during the 2019 fires. Supporting this role is an important way of securing Napa's future in an increasingly hostile environment. Enclosed bus shelters equipped with proper air filtration systems can provide safe evacuation sites for individuals who may depend on Vine buses for evacuation. It also makes waiting for the bus more pleasant on days when air quality is dangerous or elevated.

We also propose eventual fleet electrification. There are several ways of achieving this goal. Standard electrification requires lines above the street, however, it could be viewed as a serious degradation to the environment. The sight of power lines above the streets would not appeal to Napa's residents either. While battery-powered buses have become popular, there are often issues with actual travel ranges. One solution to this issue is embedded power strips, such as the system being tested at the Korean Advanced Institute of Science and Technology in South Korea, which uses wireless induction charging (Dillow, 2010). This technology is expected to be perfected by 2030 and will be commercially available by then.

The final form of this project is traditional BRT with dedicated bus lanes. Because many of the streets in are only two lanes, this would require implementing a number of one-way streets. This combined with increased parking fees will help make taking the bus an obvious choice for navigating the city of Napa.

Conclusion

The City of Napa has a lot of potential to grow and develop in the next thirty years. It needs a robust transportation system in order to do so sustainably and to its fullest capacity. This proposal provides an outline for improving an existing transit system which does not serve the existing needs of the city and will not be able to support further growth. While infrastructure and systems improvements are necessary, it is important that buses become part of the culture.



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