FTA RESEARCH

FEDERAL TRANSIT ADMINISTRATION

Mobility on Demand (MOD) Sandbox Demonstration: Fair Value Commuting

Final Report

MAY 2020

FTA Report No. 0167
Federal Transit Administration

PREPARED BY

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U.S. Department of Transportation
Federal Transit Administration

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U.S. Department of Transportation
1200 New Jersey Avenue, SE
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Metric Conversion Table

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liter	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: volumes greater than 1000 L shall be shown in m^3				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C

REPORT DOCUMENTATION PAGE	*Form Approved* *OMB No. 0704-0188*

1. AGENCY USE ONLY	2. REPORT DATE May 2020	3. REPORT TYPE AND DATES COVERED February 2017–March 2020

4. TITLE AND SUBTITLE Mobility on Demand (MOD) Sandbox Demonstration: Fair Value Commuting, Final Report	5. FUNDING NUMBERS

6. AUTHOR(S)
Hillary M. Rupert

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESSE(ES) City of Palo Alto 250 Hamilton Avenue Palo Alto, CA 94301	8. PERFORMING ORGANIZATION REPORT NUMBER FTA Report No. 0167
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Department of Transportation Federal Transit Administration Office of Research, Demonstration and Innovation East Building 1200 New Jersey Avenue, SE Washington, DC 20590	10. SPONSORING/MONITORING AGENCY REPORT NUMBER FTA Report No. 0167

11. SUPPLEMENTARY NOTES [https://www.transit.dot.gov/about/research-innovation] [https://doi.org/10.21949/1518339]
Suggested citation: Federal Transit Administration. Mobility on Demand (MOD) Sandbox Demonstration: Fair Value Commuting, Final Report. Washington, D.C.: United States Department of Transportation, 2020. https://doi.org/10.21949/1518339

12A. DISTRIBUTION/AVAILABILITY STATEMENT Available from: National Technical Information Service (NTIS), Springfield, VA 22161. Phone 703.605.6000, Fax 703.605.6900, email [orders@ntis.gov]	12B. DISTRIBUTION CODE TRI-30

13. ABSTRACT
The Mobility on Demand (MOD) Fair Value Commuting (FVC) project provides recommendations and lessons learned to help agencies, organizations, and policymakers reduce single-occupancy vehicle (SOV) commuting behavior and engage with stakeholders on systemic obstacles related to transportation choices. FVC can be used by any stakeholder wanting to understand barriers to and implement leverage points for SOV behavior change. In 2016, as part of the Federal Transit Administration (FTA) MOD Sandbox program, the City of Palo Alto received a Federal grant for a research and demonstration project to reduce SOV through the implementation of five components—Enterprise Commute Trip Reduction (ECTR), Commuter Wallet, Feebate/Cashout, Gap Filling, and Systemic Obstacles. This report presents the findings of the FVC demonstration project for these five components.

14. SUBJECT TERMS Mobility on Demand, Fair Value Commuting, Palo Alto	15. NUMBER OF PAGES 198

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT

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ACKNOWLEDGMENTS

The City of Palo Alto would like to thank the Federal Transit Administration (FTA) and Mobility on Demand (MOD) Sandbox Demonstration Program team members Christina Gikakis, Hendrik Opstelten, and Gwo-Wei Torng for serving as the Federal liaisons and project oversight team.

The City of Palo Alto would also like to thank the key project partners and their staff for supporting this project—Booz Allen; the City of Cupertino; the City of Menlo Park; the City of Mountain View, commute.org; ICF; Interline Technologies & Lab Zero; the Palo Alto TMA; ProspectSV; RideAmigos; Hillary M. Rupert, FVC Manager & Environmental Consultant; SPUR; and the University of California–Berkeley.

ABSTRACT

The Mobility on Demand (MOD) Fair Value Commuting (FVC) project provides recommendations and lessons learned to help agencies, organizations, and policymakers reduce single-occupancy vehicle (SOV) commuting behavior and engage with stakeholders on systemic obstacles related to transportation choices. FVC can be used by any stakeholder wanting to understand barriers to and implement leverage points for SOV behavior change. In 2016, as part of the Federal Transit Administration (FTA) MOD Sandbox program, the City of Palo Alto received a Federal grant for a research and demonstration project to reduce SOV through the implementation of five components—Enterprise Commute Trip Reduction (ECTR), Commuter Wallet, Feebate/Cashout, Gap Filling, and Systemic Obstacles. This report presents the findings of the FVC demonstration project for these five components.

EXECUTIVE SUMMARY

The Mobility on Demand (MOD) Fair Value Commuting (FVC) project operated in the context of Silicon Valley suburban bedroom communities that have experienced a tremendous amount of economic growth and house a high concentration of software technology employees. However, this economic success is not without unintended consequences, including increased traffic congestion and distortions in the housing market that force lower-paid workers to live farther away and commute longer distances. California is a "car-loving" culture, industry uses free parking as a perk to attract talent, and single-occupancy vehicles (SOVs) are the predominant mode of commute transportation. Due to the region's sprawling suburban development patterns, people are spending an increasing amount of time in cars and additional money on fuel and are contributing to greenhouse gas emissions. Specifically in the San Francisco Bay Area, which is home to more than seven million people in nine counties, traffic congestion is a persistently growing problem. According to the Texas A&M Transportation Institute's *2019 Urban Mobility Report,* Bay Area traffic congestion ranks the highest in the US for its classification group. Yet despite clogged roads, wasted time and money, and increased emissions and resulting health risks, uptake of alternative commute modes is low due to poor commute alternatives, parking policies, and lifestyles.

Project Design

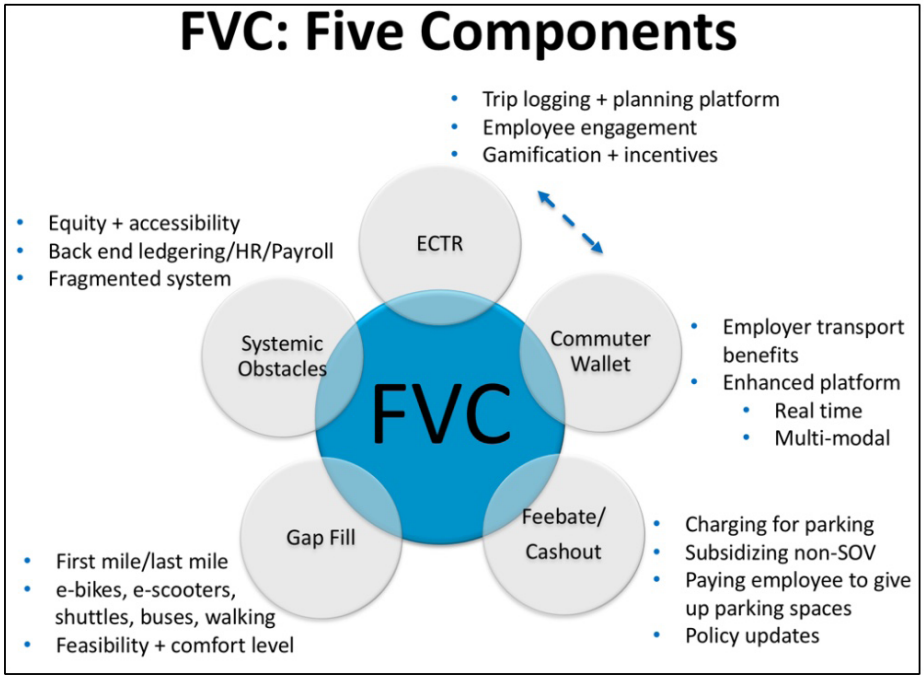
In 2016, the City of Palo Alto (henceforth referred to as Palo Alto) was awarded a $1,085,000 research and demonstration project from the Federal Transit Administration (FTA) under its MOD Sandbox Demonstration program to demonstrate FVC. The MOD initiative was designed to help communities nationwide incorporate the latest technology into their public transit services, including first/last mile connections, smart congestion management, and improved shuttle services.

The FVC project consisted of a 10-member public/private consortium that included local cities and counties, transit agencies, non-profit organizations, employers, technology startups, and planning agencies. Through this partnership and collaboration, FVC sought to incorporate its five-step framework into its demonstration project:

- Component 1: ECTR (Enterprise Commute Trip Reduction Software)
- Component 2: Commuter Wallet
- Component 3: Feebate/Cashout
- Component 4: Gap Filling
- Component 5: Systemic Obstacles

A key feature of the FVC project not found in other FTA-funded MOD demonstration projects is that FVC placed emphasis on employers and commutes. The final pilot cohort included four pilot partners—the local city governments of Cupertino, Menlo Park, Mountain View, and Palo Alto—that would pilot FVC within their organizations for up to a six-month demonstration period.

Figure ES-1
FVC components



Anticipated Outcomes, Benefits, and Impacts

As originally envisioned, FVC was hypothesized to potentially reduce SOV commuting by approximately 25% through the implementation of the five FVC components. To achieve this outcome, it was critical to identify leverage points that would support alternative commutes and understand the limitations that would impede alternative commutes. The FVC project aspired to work side-by-side with its employer pilots and project partners to accomplish the following:

- Reduce SOV car trips, vehicle miles traveled (VMT), and fossil fuel use
- Increase public transit ridership and the perception of public transit
- Create a sustainable mechanism for funding new transit, biking, carpool, and mobility services
- Create a replicable software ecosystem to enable universal trip planning and payment
- Identify systemic and institutional obstacles and how to overcome them

Conclusion and Recommendations

The FVC research and demonstration project delivered four city employer pilot demonstrations that explored and implemented, to the extent possible, all five components of FVC. The FVC project team established a high-touch approach by creating tailored educational materials and working closely with each pilot employer to assess the strengths and weaknesses of their respective commute

programs. This method of customization proved to be valuable in launching and implementing FVC at each unique employer pilot.

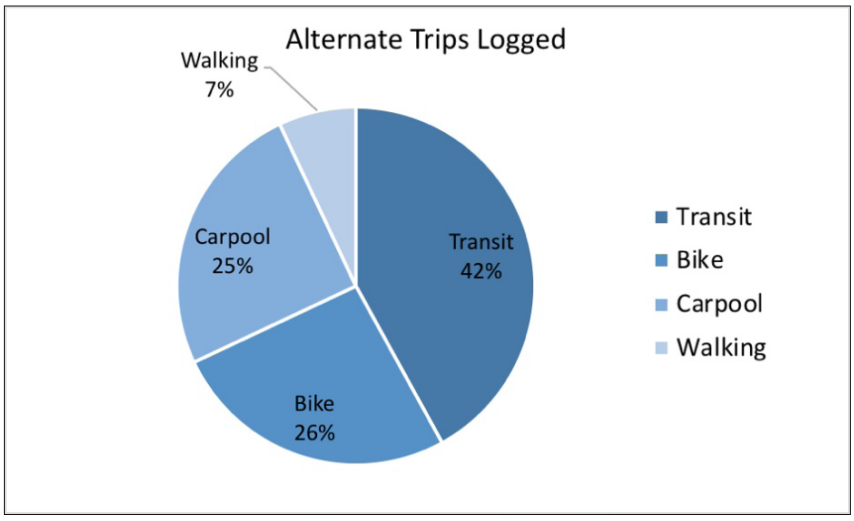
In addition to working closely with the pilot cohort to build and implement individualized pilot programs, the project team also tested the boundaries of incorporating additional technology in the form of the Commuter Wallet. Through a successful integration with the project's ECTR vendor, the Commuter Wallet demonstrated enterprise-level feasibility of integrating features that support a path toward real-time, intermodal trip planning and payment methods.

FVC was unable to establish a feebate mechanism for using parking revenues to fund non-SOV, the key component that allows for economies of scale and creates a self-funding/self-sustaining non-SOV ecosystem. It should also be noted this is a geographic, project-specific challenge. The uptake of feebate has been effective on private campuses, including Stanford University, which is in close proximity to the pilot partners. However, despite this limitation, FVC discovered that even small incentives for parking cash-out coupled with an array of behavior change programs and complementary services made a considerable impact on commuting behavior.

The four FVC pilots collectively engaged 56 participating employees and demonstrated an increase in public transit ridership and alternate commute methods. FVC also demonstrated a reduction in SOV car trips, VMT, and fossil fuel use. Over the six-month pilot period, participating employees logged 4,918 alternative trips, traveled 84,072 non-SOV miles, burned 502,365 calories, saved 41,186 pounds of CO2, and saved $21,046 in avoided auto-related travel expenses. Of the alternative trips logged, 42% were by transit, 26% by bike, 25% by carpool, and 7% by walking.

Figure ES-2

Alternate trips logged by type



FVC has shown that systemic barriers still need to be addressed to effectively create large-scale, self-sustaining non-SOV funding models. However, as illustrated through the six-month multi-city demonstration project, commuting behavior change is possible even when incorporating only small incentives, using software platforms, effectively communicating employee benefits, and focusing on employee engagement. The results of FVC are meant to be used as a starting point to encourage stakeholders in jurisdictions—local, regional, and national—to consider how the implementation of the five FVC concepts can reduce SOV commuting in their respective districts and communities.

SECTION

1

Introduction

Project Description

California is an economic powerhouse. It is home to multiple industries including agriculture, media, computer technology, biotechnology, startups, venture capital, and major ports that serve as trade hubs. In 2018, the state ranked as the fifth largest economy in the world, with a GDP of $2,968 billion.[1] The state boasts a mild climate year-round and a high population of knowledge workers to fuel its cultural diversity, entrepreneurial spirit, and innovation. Many of these workers are centralized in Northern California's Silicon Valley and adjacent San Francisco.

With its sprawling suburban development patterns, California is also known for being a "car-loving" state with ample free parking. SOVs are the predominant mode of commute transportation. Specifically, in the San Francisco Bay Area, which is home to more than seven million people in nine counties, traffic congestion is a persistently growing problem. Many residents commute between homes and jobs across different counties in the region, as indicated in Figure 1-1, which shows the average number of daily Bay Area commute origins and destinations across county lines. According to the Texas A&M Transportation Institute's *2019 Urban Mobility Report,*[2] Bay Area/Oakland traffic congestion is the nation's second worst for the classification group "Very Large Area," and San Jose traffic congestion ranks number one in the nation for the worst traffic congestion for the classification group "Large Area."

The FVC project operated in the context of Silicon Valley suburban bedroom communities that have experienced a tremendous amount of economic growth and houses a high concentration of software technology employees. However, this economic success is not without unintended consequences such as increased traffic congestion and distortions in the housing market that force lower-paid workers to live farther away and commute longer distances. People are spending an increasing amount of time in cars, additional money on fuel, and are contributing to climate-changing emissions. Traffic congestion and long commutes not only impact quality of life but also choke economic prosperity. Employers such as the project's pilot partner municipal governments have found it increasingly difficult to attract and retain a qualified workforce.

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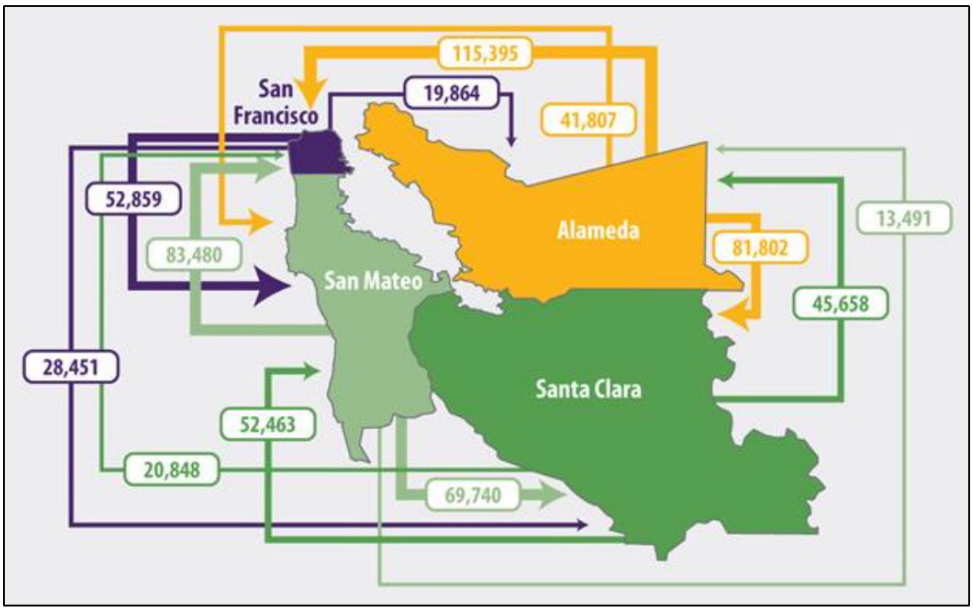
[1]State of California (2019), CA_GDP_World_Ranking. http://www.dof.ca.gov/Forecasting/Economics/Indicators/Gross_State_Product/,

[2]Schrank, D. (August 2019), Urban Mobility Report 2019, https://static.tti.tamu.edu/tti.tamu.edu/documents/mobility-report-2019.pdf.

Figure 1-1

Number of residents commuting to another county within region, 2018



Source: Joint Venture Silicon Valley, State of the Valley 2020 Index

Despite clogged roads, wasted time and money, increased emissions, and resulting health risks, uptake of alternative commute modes is low. Reasons for this include the following:

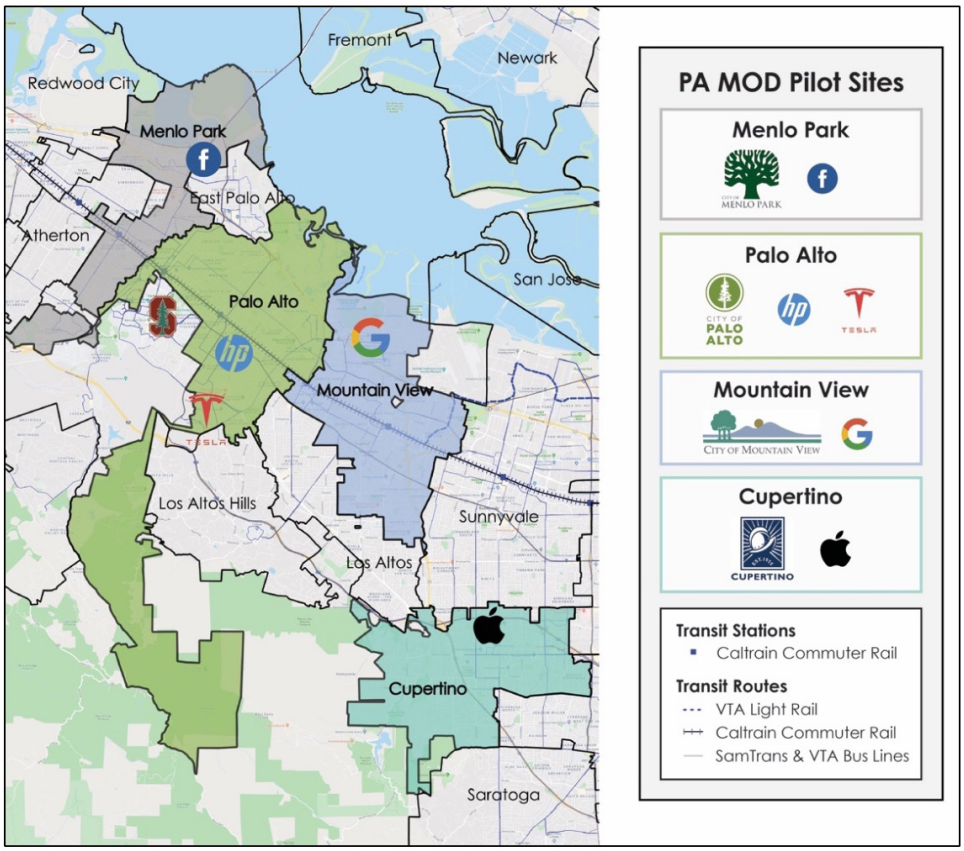
- Some commuters are faced with poor alternatives because they live in low-density areas that do not support traditional transit service or areas in which market-driven services are not available. These "transit deserts" make it nearly impossible to practice non-SOV commutes.
- Systemic obstacles such as first/last mile and timed transfers between providers limit the attractiveness and convenience of alternative modes. This is particularly challenging with multimodal trips due to a lack of integrated trip planning, lack of interoperability between transportation service providers, and disparate payment systems.
- Most commute alternative programs do not have a stable or sizable funding mechanism to ensure their continuity and sustainability. The cost of providing commute alternative services is considered an overhead cost that should be minimized.
- A handful of suburban employers have reduced commuting from 75% to 50% SOV, yet without unifying technology and policymaking there is limited ability to extend these efforts to a larger population.
- Free parking is a longstanding perk and expectation in large parts of the Bay Area. This further incentivizes SOV.

- In addition to work commitments, people also have life commitments (children requiring drop-offs or pick-ups, school, errands, etc.) and, trying to incorporate non-SOV transportation planning into an already-hectic schedule is impractical. Often, it is easier to get from Point A to Point B by SOV.

Silicon Valley is the epicenter of startup culture and, more specifically, the city of Palo Alto (which is adjacent to Stanford University) is home to the critical mass where startups collaborate. It is the place that loves curiosity, takes risks, seeks solutions to difficult challenges, and leads innovation. Facebook, Google, HP, and PayPal were all founded in Palo Alto, and it is not surprising that the FVC technology and policy solution was also created there. If properly implemented, FVC is estimated to have the potential to reduce the Bay Area SOV commute share by 25% based on the success at nearby Stanford.

Figure 1-2

Peninsula map of pilot sites and regional employers



Stanford University's commute program provided the conceptual starting point for the sustainable and scalable commute trip reduction business model tested with FVC. Stanford's revenue-neutral model charges SOV commuters for parking permits and rebates that revenue for non-SOV modes. Stanford also supports first/last mile gap-filling solutions with shuttle buses, rideshare, and electric bikes/scooters. The model has proved successful, and Stanford has reduced the

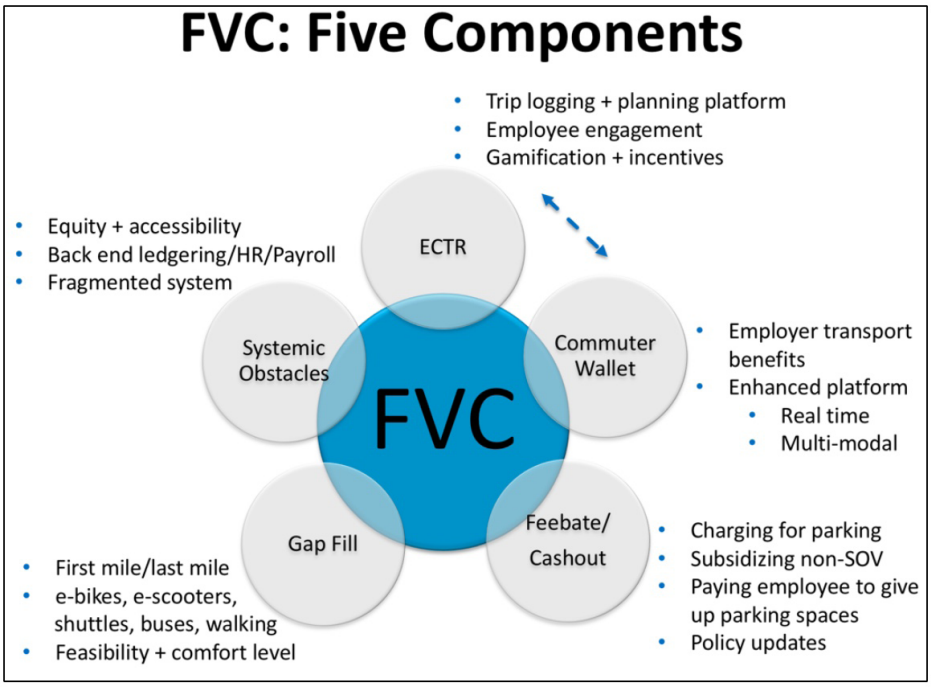
SOV share from 75% to 50% (with the transit share increasing from 8% to 31%), eliminating the need for $107M in new parking structures.[3]

Inspired by this success, FVC sought to reduce the Bay Area SOV commute share by implementing a set of solutions consisting of five components that were designed to address many of the issues described above. The FVC project is complex in that it addresses technology, policy, employers, and low-income topic areas and sought out a solution to the systemic barriers that uphold SOV driving behavior through the following:

- **Enterprise Commute Trip Reduction** (ECTR) software platforms that automate employer commute programs. These platforms will integrate with employer human resources and payroll functions and distribute benefits such as loading Clipper transit fare cards and allowing pre-tax commuter benefits purchase of transit passes while collecting and reporting commuter mode choices. The project partner vendor is RideAmigos.
- **Commuter Wallet** is a mobile multimodal trip planning platform that will be developed with a seamless combination of public/private transit and employer incentives. Commuter Wallet integrates MOD products such as Waze Carpool and Scoop. Interline Technologies & Lab Zero are the Commuter Wallet development partners. The Commuter Wallet will integrate with ECTR.
- **Feebate**, or "revenue-neutral workplace parking feebate," charges a fee for SOV commutes and rebates that revenue to non-SOV commutes. This is structured so that there is no cost to employers. Alternatively, a "cashout" system is used to incentivize non-SOV commutes.
- **"Gap Filling"** describes analytics to identify commutes with poor alternatives and subsequent attempts to improve them. Examples include subsidizing Lyft/Uber rides to and from transit stops, an e-scooter loan-to-own to provide first/last mile connections to transit, bike network improvements to connect to transit, and microtransit to provide first/last mile service to larger transit services.
- **Systemic Obstacles** are identified and alleviated by a) enabling better public transit routes that cross county borders, b) better integrating transit fares within multi-agency trips, c) integrating transportation payment systems, and d) developing a healthy, interoperable mobility software ecosystem following open standards.

[3]Lutino, C. (2013, September 23)," Stanford avoids paying $100 million for parking garages, " https://www.myparkingpermit.com/blog/stanford-avoids-paying-100-million-parking-garages/.

Figure 1-3
FVC components



Project Differentiator

A key feature of the FVC project not found in other FTA-funded MOD demonstration projects is that this project placed an emphasis on employers and commutes. To that end, Palo Alto ran outreach and coordination efforts with regional high-profile municipal employers and their decisionmakers who have the authority to work with their employees on commute behavior and commute policies. It was through their influence, control, and direction that employees were incentivized and encouraged to participate in the FVC demonstration project. The FVC project would not have been successful without the buy-in and support of the executive leadership teams and/or City Council at the municipal pilot sites.

> "Commuting in the Bay Area is like an existential crisis."
> — Program Participant, City of Cupertino

Project Partners

Palo Alto, as the lead agency, managed the overall FVC demonstration project. At the project's inception, Palo Alto contracted with a consultant environmental manager to manage all components and partners of FVC and retained her throughout the duration of the project. Palo Alto executive leadership maintained oversight, and administrative units supported the project. Additionally, Palo Alto also served as one of the pilot partner employers and co-produced the equity plan component of the project. The project consortium consisted of a dynamic cohort of partners that brought together expertise from a range of industry groups.

Table 1-1

FVC Project Partners

Organization	Description	Role
City of Palo Alto	Municipal local government, 1,001-5,000 employees	Lead Agency, FVC Manager, Pilot Partner Employer
Prospect Silicon Valley	Non-profit organization specializing in connecting technology industry to fulfill societal needs in transportation and clean energy	Principal Investigator
City of Mountain View	Municipal local government, 501–1,000 employees	Pilot Partner Employer
City of Menlo Park	Municipal local government, 201–500 employees	Pilot Partner Employer
City of Cupertino	Municipal local government, 51–200 employees	Pilot Partner Employer
Commute.org	Governmental agency overseeing Transportation Demand Management (TDM) efforts for neighboring San Mateo County	TDM Agency Advisor + Subject Matter Expert/Advisor
Palo Alto TMA and City of Palo Alto	Non-profit organizations made up of local businesses and institutions that provide funding for and management of transportation programs	Equity Plan
SPUR	Non-profit policy think tank; produced white paper on regional parking policy	Parking Policy Paper
RideAmigos	Technology vendor providing cloud-based commuter management solutions for regional, corporate, and campus commuter networks	ECTR Software Vendor
Interline Technologies + Lab Zero	Technical services and products company that helps organizations understand and improve transportation networks, digitally	Commuter Wallet Software Developer
Booz Allen, ICF, UC–Berkeley	Academia and consulting firms; responsible for evaluation plan, data collection, project evaluation.	Independent Evaluation Team

Purpose, Goals, Objectives

The primary focus of this project was to shift mode to non-SOV through the implementation of the five FVC components. To achieve this vision, it was critical to identify leverage points that would support alternative commutes and to understand the limitations that would impede alternative commutes.

Table 1-2

FVC Project Purpose, Goals, Objectives, and Leverage Points/Limitations

Purpose, Goals, Objectives	Leverage Points and/or Limitations
Reduce SOV car trips, reducing VMT and fossil fuel use.	• Understanding of employer policies and benefits. • Effective communication of employee benefits. • Flexibility in work schedule. • Work while commuting (transit) policy or work from home policy
Increase public transit ridership and improve perception of public transit.	• Ability to deploy incentives.
Create sustainable and scalable business model for funding non-SOV.	• Employer policies around parking.
Create software ecosystem for universal trip planning and payment.	• Willingness to use technology, interest in gamification. • Comfort around using carpooling apps, which might mean commuting with a stranger.
Identify systemic and institutional obstacles and ways to overcome them.	• Understanding that FVC is not "all or nothing"; sometimes an SOV commute • is simply unavoidable and best way to get from point A to point B. • Fragmented transportation ecosystem. • Backend payroll ledgering.

Project Evolution

Public-Private Partnerships

The project necessarily evolved when the project team was unable to reach agreement with two key project partners—the original principal investigator and an ECTR vendor. These challenges arose due to varying perspectives around risk tolerance, management styles, and expectations. FVC started out with good intentions but the team quickly found that it was challenging to run this type of project. The FVC public-private partnership injected fast-paced entrepreneurial spirits and personalities into a process-oriented local government culture—in a car-loving area, no less. Partnerships are difficult but are important to public policy. Key lessons in creating and sustaining a public-private partnership were the ability to manage expectations of all organizations and a commitment of shared values by all project partners. Of equal importance was the ability to remain flexible on competing priorities, timelines, bandwidth constraints, and risk tolerance.

Key lessons in creating and sustaining a public-private partnership were the ability to manage expectations of all organizations and a commitment of shared values by all project partners. Of equal importance was the ability to remain flexible on competing priorities, timelines, bandwidth constraints, and risk tolerance.

In replacing these partners, Palo Alto proposed several changes to the Statement of Work (SOW) to ensure that the project would proceed to demonstration, including restructuring the number of participating pilot locations from 11 to 4 and reducing the gap analysis locations from 8 to 1–3. Palo Alto quickly realized that although the potential pilots recognized the value of the project, they lacked the bandwidth to implement FVC. In part, the bandwidth concerns related to the project's duration and pilot partners were unsure where to staff the project within their respective organizations. For these reasons, Palo Alto recommended a high-touch approach with a scaled-down number of pilots.

Feebate

The project faced a longer-term systemic barrier when the concept of the "feebate," in which newly-instituted parking charges were envisioned to provide revenue to fund commute incentives, could not be implemented. To implement a feebate arrangement, systemic parking pricing policy modifications and infrastructure upgrades to support those changes need to occur. Any organization assessing the viability of feebate should consider factors such as the feasibility of charging for parking, existing policies, benefits, and what, if any,

implications parking fees would have on employees who drive. Organizations should also consider whether or not they have parking infrastructure that will support parking charges, such as gated infrastructure or license plate readers. Feebate was not something the pilot partners were able to consider during the demonstration period, and this concept was ultimately restructured to a "parking cashout" so that non-SOV commutes could be partially subsidized. Parking cashout illustrated that commuting behavior change is possible even when incorporating only small incentives.

Parking cashout illustrated that commuting behavior change is possible even when incorporating only small incentives.

Evaluation

The project evaluators were Booz Allen, UC–Berkeley, and ICF.

Project Deliverables

The FVC project delivered the following:

- Four city partnerships/pilots (City of Cupertino, City of Menlo Park, City of Mountain View, and City of Palo Alto)
- Commuter Wallet platform and white paper
- SPUR white paper (addresses pricing policy)
- Independent Investigation—"Gap Analysis" (first/last mile analysis that does not directly impact pilots but informs micromobility policy and effectiveness)
- Palo Alto TMA (PATMA) Equity and Accessibility paper

SECTION

2

Project Description

Project Objectives

The primary focus of this project was to shift mode from SOV to non-SOV by creating a multi-pilot cohort to test the implementation of the five FVC components. The demonstration focused on employers and commutes, and the project team prioritized implementation of the pilot programs, followed by building and integrating the Commuter Wallet. Concurrently, the project team worked on initiatives to support the pilot programs by identifying barriers to non-SOV commutes and potential solutions to overcome those barriers. These initiatives included investigations into charging for parking, accounting for the full cost of employer-provided parking, creating subsidies or incentives, and understanding transportation benefits.

Securing the Pilot Partners – Long Lead Time

In its original form, FVC consisted of public and large private sector pilot participants. However, the largest private employers already offer significant commute programs that focus primarily on providing their own shuttle-bus services and, therefore, opted not to participate. On the other hand, municipal employers in the region had expressed interest in participating in FVC through letters of support or email inquiries, and the project team prioritized its efforts around those employers as well as previously-identified potential participants.

Building a multi-city pilot cohort required a long lead time and multiple meetings due to each City's need to create alignment and secure buy-in within their internal departments and internal stakeholders. Each partner City was recruited at various intervals throughout the project. It took approximately 12 months to secure all four pilot partners, obtain an executed Memorandum of Understanding (MOU) from all parties, and launch the pilots. With each pilot partner, there was a combination of education, ideation, internal executive review, internal buy-in by other departments, refinement, and final review and approval.

FVC Implementation – How to Build + Engage + Run

In implementing FVC, each pilot partner and its stakeholders—staff from the City Manager's Office or Human Resources or Transportation departments—were provided with in-person training and implementation information, including the following:

- **Introductory presentation** to explain FVC and explored the pilot partner's goals and objectives for participating in the FVC demonstration
- **Pilot site assistance,** a summary of the types of assistance that would be provided to the pilot partner in the categories of Program Set Up, Marketing and Support, Deployment, and Wrap Up
- **Brainstorming and information sessions** to assess the opportunity for mode shift, understand pilot program benefits and incentives, and create challenges
- **ECTR onboarding** to introduce RideAmigos staff and provide support for customizing each partner's RideAmigos website
- **Commuter Wallet deployment** to train and roll out the Commuter Wallet component of the project
- **Pilot partner employee survey process**, a description of the steps that would be taken to deploy pre- and post-pilot employee surveys that supported the Independent Evaluation and
- **Post-pilot** monthly meetings to solidify relationships and establish next steps

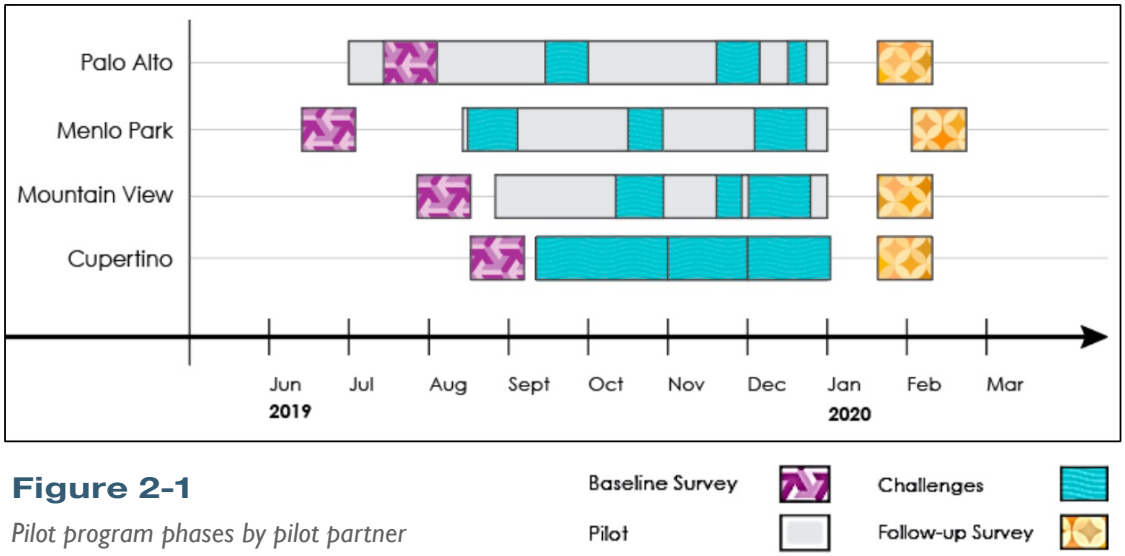


Figure 2-1

Pilot program phases by pilot partner

Each pilot partner was asked to designate a pilot site manager to act as a single point of contact for coordinating the pilot program rollout. In some cases, the pilot site manager enlisted the help of colleagues to act as designated "Commute Champions" or "Commute Buddies," people who were experienced with alternative commutes and acted as ambassadors to generate interest and excitement in the pilot program

In some cases, pilot site managers enlisted the help of colleagues to act as designated "Commute Champions" or "Commute Buddies," people who were experienced with alternative commutes and acted as ambassadors to generate interest and excitement.

and who helped employees new to alternative commutes. The project team held regular check-ins with each pilot partner on a bi-weekly basis throughout the duration of each pilot program.

Additionally, the project team produced documents for pilot partners depending on their specific needs, such as:

- **Employee handout** summarizing existing and new pilot program commute benefits
- **Pilot program participant overview** with sample communications language describing the pilot partner's new pilot program, benefits, and requirements
- **Commute Concierge handout** describing the Commute Concierge
- **Ideal participant criteria** describing how a subset of the baseline survey results would be used to determine whether employees who opted to share their results would be ideal candidates for the pilot program. Defining the ideal candidate can be subjective, objective, or a combination of both; in the context of this demonstration, the ideal participant was a current SOV commuter who was willing to try alternative commutes at least two times per week

The pilot partners also developed their own documents to suit their needs:

- A "checklist" that one employer distributed to simultaneously educate their employees about available benefits and to gauge interest about specific proposed Pilot Program features
- A booklet containing comprehensive program descriptions, instructions, and relevant forms
- Waivers for employees to sign when checking out employer-provided e-scooters and e bikes as part of gap-filling measures

Pilot Partner Objectives + Obstacles

The pilot partners had objectives and obstacles they wanted to address with their pilots. They were similar in prioritizing climate change and congestion reduction and wanting to improve their competitiveness for attracting and retaining employees in the competitive Silicon Valley environment by easing their employees' commutes. All pilot partners already offered commute benefits of some kind, and some wanted to improve the way they communicated or delivered benefits to their employees or the way they validated benefit claims. Additionally, the pilot partners wanted to use the pilot to evaluate the usefulness of existing benefits, thus providing a basis for recommending more permanent expansions or changes to benefits following the pilot.

Operational Questions

Through the course of setting up and running the pilot program, pilot partners raised specific questions about policy, programming, and operation that prompted the project team to produce several short advisory memos. To assist with the development of these memos, the team used the Transportation Demand Management (TDM) e-mail listserv TRANSP-TDM@LISTSERV.USF.EDU, (membership of approximately 1,500 TDM practitioners, managed by the University of South Florida), attended relevant webinars, and contacted local bicycle clubs about e-bikes. Advisory memos included the following:

- **Employee Incentive Advice** – focused on different aspects of setting up incentive programs, including programming, trip logging, cash prizes, and internal rewards.
- **Understanding the Cost of Employer-Provided Parking** – summary of why it is important to know how much an employer spends to provide workplace parking; two different methods to value parking; and recommended reading.
- **Commute Time Policy Advice** – addresses the question of whether any time spent commuting could be counted as work time.
- **Where to House a Commute Program** – pros and cons of running a commute program from the City Manager's Office or Human Resources or Transportation departments.
- **E-Bike Advice** – tips or advice to first-time e-bike riders, gathered from local bicycle clubs and TDM practitioners nationally

Discussions with pilot partners also uncovered a wide variety of policy issues and questions internal to each organization.

Discussions with pilot partners also uncovered a wide variety of policy issues and questions internal to each organization. These were important for pilot partners to resolve and demonstrated the value of the pilot project as a catalyst for focusing the attention of organizational leadership by prompting the evolution and refinement of organizational policies and practices. In some cases, such questions resulted in process delays while awaiting resolutions; in others, decisions limited some aspects of the pilot programs but stimulated plans for potential future action. Examples of the types of policy issues encountered include those in Table 2-1.

Table 2-1
Policy Issues

Human Resources/Employment Rules
Equitable subsidies – Do subsidies or incentives unfairly reward some employees more than others?
Parking as a subsidy – Should the cost of providing (free) parking be considered an employee benefit?
Negotiated benefits – Would charging for parking or taking away parking permits violate existing labor agreements or trigger new negotiations?
Use of funds – Should organizational funds (or more particularly public tax dollars) be used to incentivize municipal employee behavior?
Commute time – Should any productive work time spent while commuting on transit be counted toward satisfying a 40-hour work week?
Non-benefited employees – To what extent may a commute program incentivize travel behavior of non-benefited employees?
Internal Process
Where should a commute program be housed? What is the right balance of power, responsibility, and perspective of the different stakeholder departments (e.g., City Manager's Office, Human Resources, Transportation)?
Gap Filling
Bicycle/scooter municipal fleet – What are the legal ramifications of maintaining a bicycle or scooter fleet for employee use?

Assessing Opportunity for Mode Shift

An analysis of baseline survey responses collected from approximately 450 employees from all four pilot partners illustrates the opportunity for mode shift. Pilot partner employees are located across six of the nine San Francisco Bay Area counties, and the majority of employee home locations, shown as dots on Figure 2-2, are concentrated along the San Francisco Peninsula in San Mateo County and Northern Santa Clara County. This is within proximity to major transit lines, shown as black lines. The colors of the dots indicate respondent primary commute mode; the majority, 61%, of all pilot site employees drive alone to work, as illustrated with purple dots. Although this is less than the San Mateo County average of 69% or the Santa Clara County average of 74%,[4] there is still substantial opportunity for the pilot sites to encourage mode shift away from drive-alone commutes.

[4]Commute Mode Choice (May 2018), http://www.vitalsigns.mtc.ca.gov/commute-mode-choice.

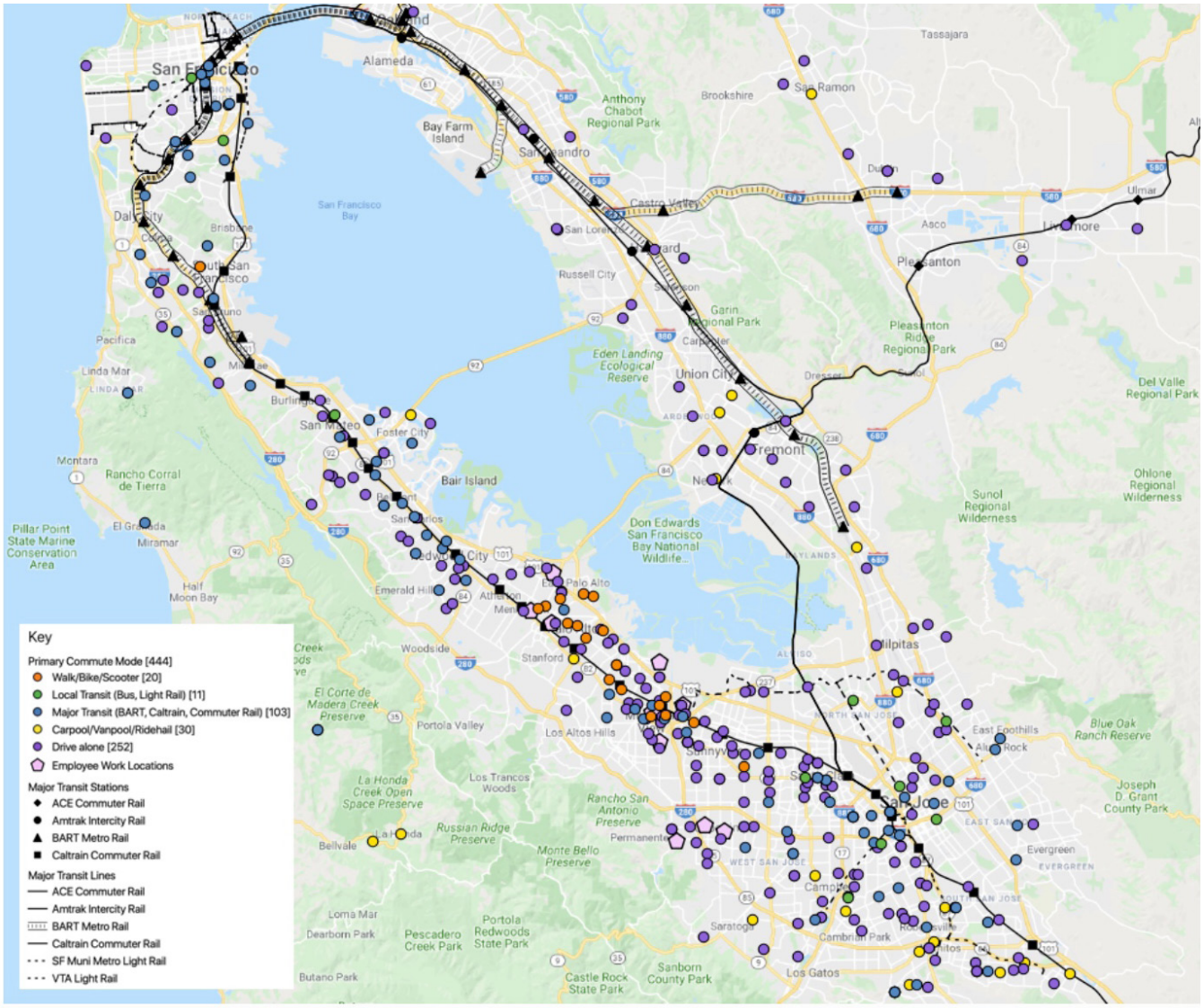


Figure 2-2

Employee home locations and primary commute mode

The analysis leveraged modern trip planning software to generate realistic intermodal commute trip itineraries for each employee for walk-to-transit, micromobility-to-transit, and drive-to-transit mode combinations and compared those itineraries to a baseline driving itinerary. A "reasonable" transit trip was defined as taking up to twice as long as driving and costing up to the same as driving. Micromobility modes included individual-use bikes, e-bikes, or e-scooters or hypothetical access to bikeshare, e-bikeshare, or e-scootershare systems. The analysis also explored the potential for employees to commute to work directly using micromobility.

The analysis concluded that, as a baseline, 15% of the employees analyzed could have a reasonable commute if they walked to transit. However, use of micromobility modes to fill first/last mile gaps would increase that percentage to 58%, almost three times as many employees (387% increase).

This substantial increase in competitiveness was attributed to the longer first/last mile distances and higher first/last mile travel speeds afforded by micromobility, combined with low cost. Figure 2-3 shows how many more employees could have reasonable transit commutes using micromobility (blue dots) compared to those who could walk to transit (orange dots). Further, of the 61% of employees who currently drive alone, more than half (34% of all employees) could potentially switch to a reasonable commute by transit.

Although this analysis did not predict actual transit ridership, it illustrated the high potential for the use of micromobility modes to fill first/last mile connections to transit. The memo contained recommendations for how various types of stakeholders (transit agencies, municipal governments, employers, and micromobility solution providers) could advocate for, incent, or provide gap-filling micromobility solutions and support the provision of infrastructure to support safe travel by micromobility modes.

Benefits + Incentives Evaluation

The pilot partners already had an assortment of commute benefits, and the pilot partners used the pilot program to help fill respective gaps and/or expand their program to include more modal alternatives. The project team met multiple times with each pilot partner to help design its pilot program. The benefits and incentives evaluation process started with learning about the existing commute program benefits from the pilot partner and identifying challenges related to policy, internal process, and employee uptake/behavior. As a result of these conversations, the project provided a menu of options in the categories of Rewards/Prizes, Transportation Subsidies, Equipment and Services for Gap Filling, Parking Cashout, and Policies to Discourage Driving that would help pilot partners think beyond the boundaries of their existing programs and gauge what was feasible within their respective organizations. Table 2-2 is a full comparison of existing vs. pilot program benefits by pilot partner.

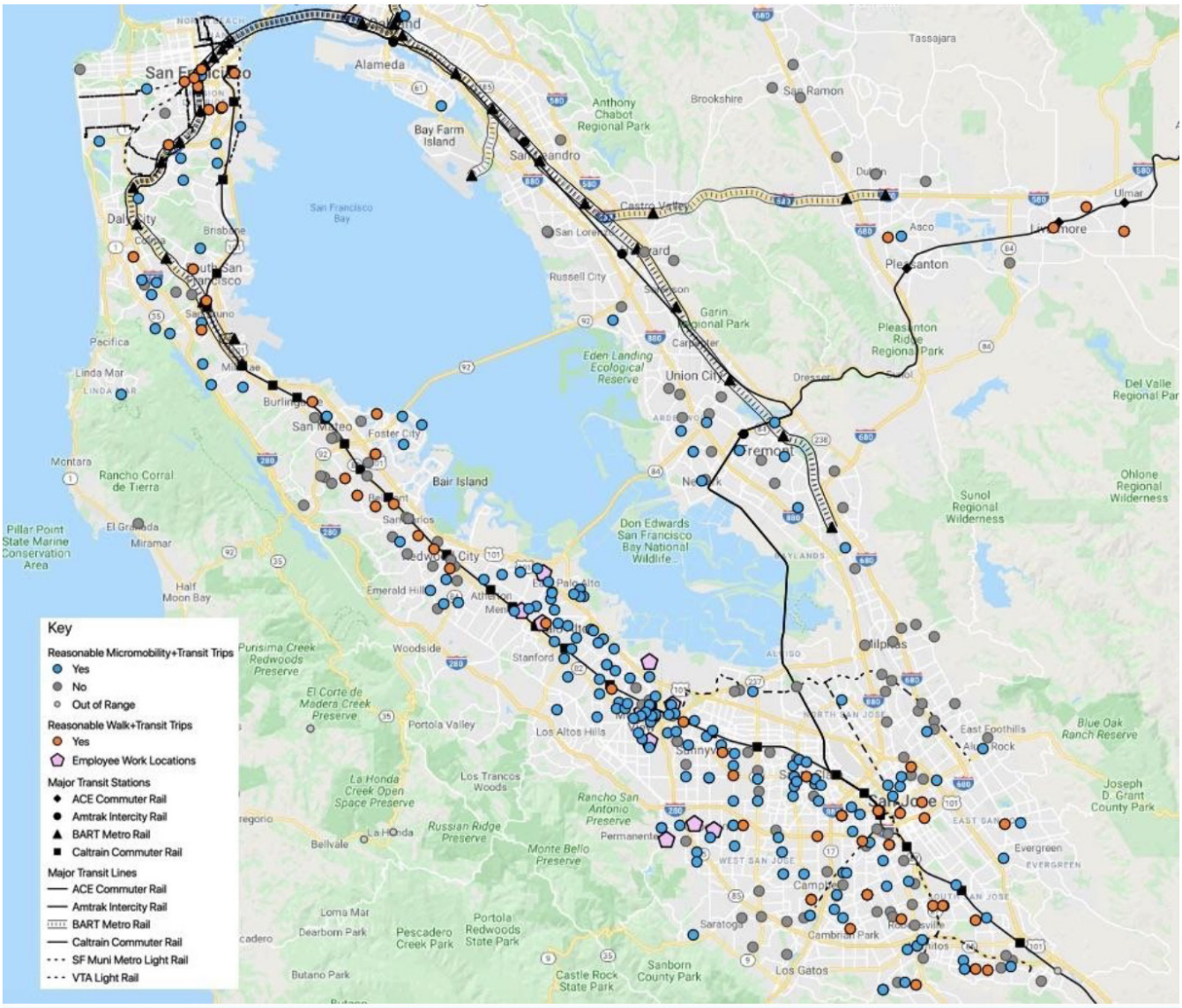


Figure 2-3

Employee home locations with reasonable micromobility-to-transit commutes

Table 2-2

Pilot Partner Existing Commute Program and Pilot Program Benefits

Existing Benefits	Pilot Program Benefits
City of Palo Alto	
Pre-Tax: 25% parking at transit subsidy	Pre-tax: 100% parking at transit subsidy
Pre-Tax: 25% transit subsidy	Same as existing
Pre-Tax: 25% vanpool & rideshare subsidy	Same as existing
Post-Tax: 25% parking at transit subsidy	Post-tax: 100% parking at transit subsidy
Post-Tax: 25% transit subsidy	Same as existing
Post-Tax: 25% vanpool & rideshare subsidy	Same as existing
Free Caltrain Go Pass	Same as existing
$20/month bicycle voucher	Same as existing
$20/month walk voucher	Same as existing
$30/month carpool voucher	Same as existing
City of Menlo Park	
$1.50/day transportation allowance (primary modes)	$1.50/day or $75/mo for 11+ primary or first/last mile trips
[No transit parking reimbursement]	$40/month transit parking reimbursement
$75 commuter check	Same as existing
E-scooter/e-bike loan program	Same as existing
Free Caltrain Go Pass	Same as existing
City of Mountain View	
[No parking cashout]	$3/day parking cashout
[No E-bike loan program]	E-bike loan program
$100 transit subsidy	Same as existing
$30–$50/yr walk reimbursement	Same as existing
$30–$50/yr bike reimbursement	Same as existing
$20 bike maintenance voucher	Same as existing
Scoop carpool program	Same as existing
Guaranteed ride home program	Same as existing
Bike parking, lockers, showers	Same as existing
City of Cupertino	
[No parking cashout]	$2/trip parking cashout
[No transit expense reimbursement]	$75 transit, carpool, bikeshare expense reimbursement
Transit, vanpool, or park-and-ride pre-tax reimbursement	Same as existing
4 hrs PTO/yr for walking/biking	Same as existing
Microtransit shuttle	Same as existing
E-bike loan program	Same as existing
Bike parking, lockers, showers	Same as existing

Behavior Change Campaigns – "Challenges" + Rewards

Each pilot program implemented behavior change campaigns to further incentivize participation and mode shift. These campaigns were limited to 2–3-week sprints and for each challenge, and the pilot partners determined specific behaviors or milestones they wanted to encourage and the mechanisms for rewarding behavior. RideAmigos worked with each pilot site to outline basic recommendations for structuring a challenge and demonstrated the administrative tools available on the RideAmigos platform.

The early challenges were generally designed to encourage employees to use the ECTR platform to log their trips. Second- and third-round challenges tended to focus on maintaining momentum. Most pilot partners used a tiered approach that recognized most or all employees for participating, then distributed prizes to higher achievers. Some pilot partners used a point-based challenge to reward prizes to all employees who achieved a specified threshold. The pilot partners were careful to select categories that were inclusive of the various modal options (transit, walk/bike, carpool) to engage as many employees as possible while also creating different award subcategories that would help avoid rewarding only one top-performing employee time after time.

The built-in reporting functions of the RideAmigos platform allowed for quick rankings by trips, mode, distance, calories, and carbon dioxide, and a challenge dashboard was visible to all participants, helping employees track their progress and competitiveness with their colleagues.

Promoting and celebrating challenges with fun titles not only encouraged participant behavior, it also helped to promote the larger messages about commute alternatives to the rest of the workforce who heard about the pilot programs.

> "Prior to the commute pilot program, I occasionally rode my bike to work; roughly 1 to 3 times per month. The challenges during the commute pilot program encouraged me to ride my bike to work more frequently, with me ultimately riding bike to work for 3 days most weeks. As a result, biking to work has become a habit. I continue to ride my bike to work 3 or more times each week."
>
> —Program Participant, City of Mountain View

The pilot partners demonstrated great creativity in motivating their employees with catchy challenge names. Collectively, the pilot partners conducted 13 challenges throughout the pilot program, examples of which are shown in Table 2-3.

Table 2-3

Challenges and Rewards

"Challenge" Name	Reason
California Clean Air Day: Social Media Contest	Tied to specific event
Fall Back but Don't Fall Off	Focused on change from Daylight Savings Time to Standard Time
Smart Commuter Bingo	Employees could win prize based on accomplishing combinations of actions shown on Bingo game board
Transit Tycoons	Emphasizing transit and intended to coincide with employer's new on-demand community shuttle
Part of Your World picture challenge	Encouraging employees to use their alternative commute to observe and interact more with their environment
Don't-Fall-Off-the-Wagon December	Designed to keep employees engaged during winter month
Range of Reward Amounts: • Certificates of recognition • Employer-branded merchandise ranging in value from $5 to top prize of $75 • Gift certificates mostly valued around $25 • Increased parking cashout amounts (one Challenge increased cashout amount from $3 per day to $5 per day; another awarded flat $10 for winner of each of eight categories)	
Certificate Award Titles: • "Memoirs of a Traveler," "Globetrotter" – most trips traveled • "Be My First, Be My Last" – most first-mile and last-mile trips traveled • "In My Happy Bubble" – shortest average commute traveled • "Sweat-er Weather," "Healthiest Commuter" – most calories burned • "Pass on That Gas," "Footprint" – most carbon dioxide saved by not traveling via car • "Carpooler Ruler" – most carpool trips traveled • "Eclectic Electric" – most micromobility trips traveled • "Transit Bandit" – most transit trips traveled	

Enterprise Commute Trip Reduction Platform (ECTR)

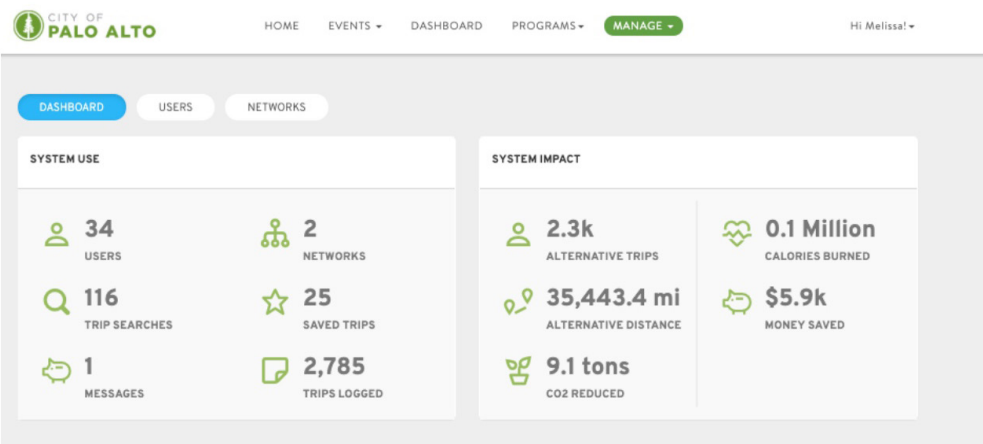
The RideAmigos software platform provided key functionality for automating employer commute programs. Each pilot site had the ability to customize the appearance and content of the platform. Key features and functionality include:

- Account-based trip logging system to collect and report commuter mode choices and trips taken
- Ability to host challenges
- Dashboards to report aggregate and individualized transportation and sustainability metrics

RideAmigos provided a user-friendly interface that focused on the user experience, data collection, and dashboards. Figures 2-4 through 2-7 illustrate examples of the ECTR interface.

Figure 2-4

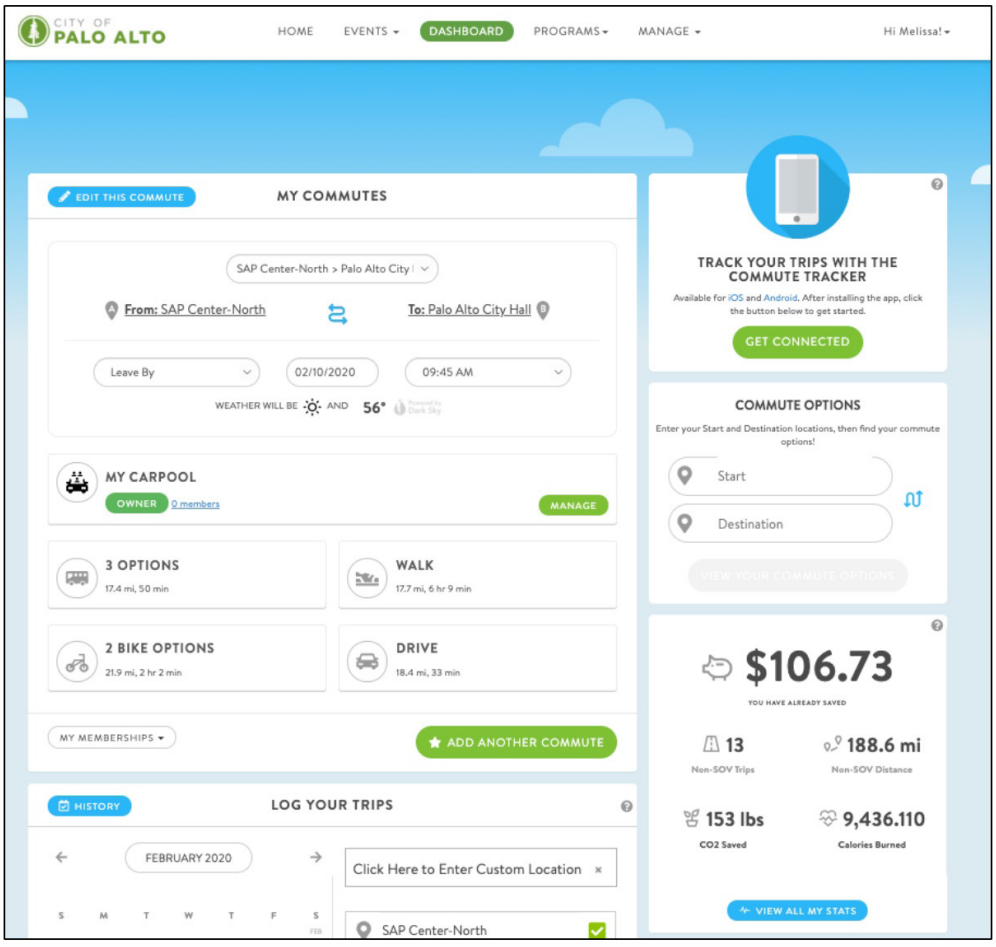
ECTR example administrator's dashboard



Used with permission from RideAmigos

Figure 2-5

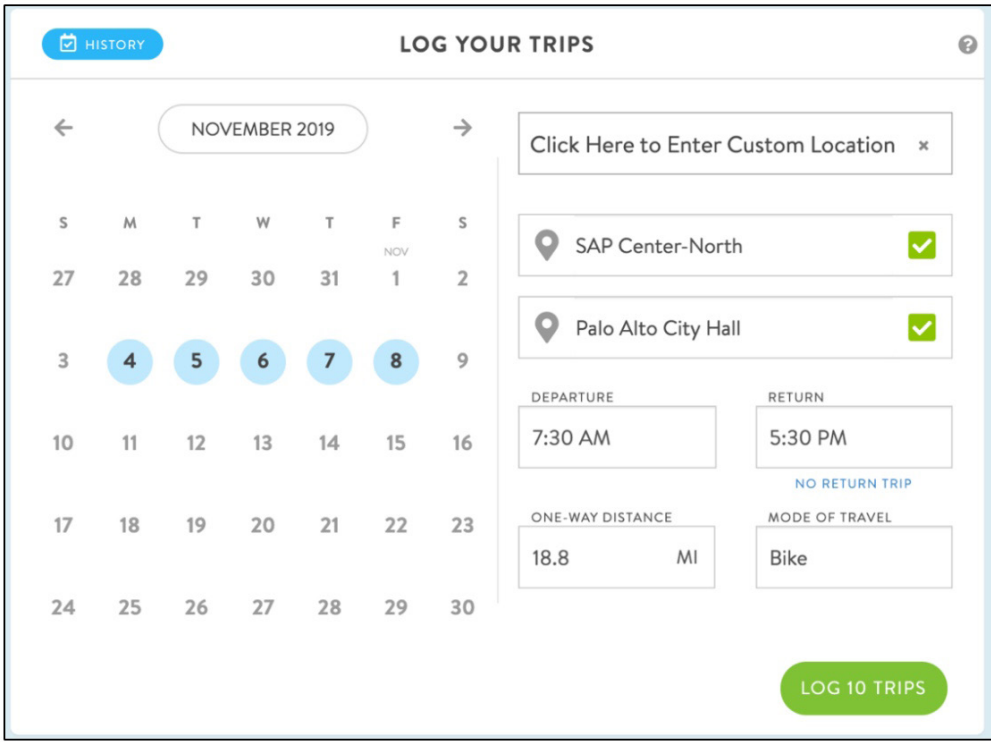
ECTR example user dashboard



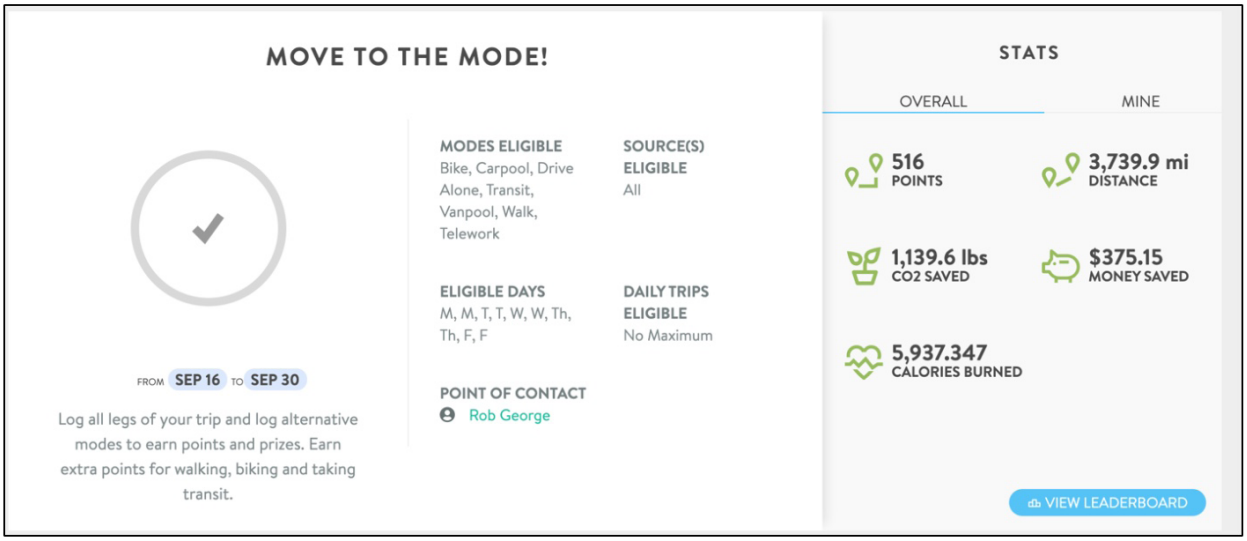
Used with permission from RideAmigos

Figure 2-6

ECTR example trip logging screen



Used with permission from RideAmigos



Used with permission from RideAmigos

Figure 2-7

ECTR example personal challenge dashboard

Gaps in ECTR Functionality

As a result of the fragmented mobility ecosystem, there are still limitations in ECTR functionality, such as backend integration with employer human resources and payroll functions, also known as ledgering. As part of this demonstration, a workaround in the form of a spreadsheet was used to illustrate the flow of logic and address simple calculations. However, this still remains a manual process. In addition, the distribution of benefits such as loading commuter cards or transit passes–handling payment, and disbursement functions is also a manual function. Additional development, integration, and automation of these feature sets would ease the administrative burden of managing a commute program and make it easier for employees.

Commuter Wallet

The purpose of deploying the Commuter Wallet software component was to fill a gap between existing software platforms by providing employees with real-time, intermodal trip plans and linking those trip plans to eligible commuter benefits and to educate employees first-hand about their commute decision-making. The timeline of the Commuter Wallet can be summarized as follows: three months for market research and drafting the RFP scope, four months for the City procurement process, three months for development, and three months for Commuter Wallet operation.

Procurement Process

The project team drafted a Request for Proposals (RFP) and specified the desired functions of the Commuter Wallet, including intermodal trip planning, payments and incentives, integration with the ECTR platform, available/expected data inputs, and required data outputs and reporting. Drawing upon feedback gained from the market research, the RFP also included a section describing, for each topic, known constraints and the type of scope flexibility the City was willing to consider.

Given the high degree of industry outreach and the seeming compatibility of the Commuter Wallet concept with the growing number of MOD and Mobility as a Service (MaaS) applications being developed, the City received limited proposals. In some anecdotal discussions with developers afterwards, it appeared that a blend of factors discouraged vendors from proposing, including:

- Uncertainty/risk exposure about the requirement to integrate with the RideAmigos platform
- Uncertainty around data availability from mobility service providers
- Uncertainty around budget (the City debated over whether to disclose the available/anticipated budget, and ultimately chose not to)

The two most credible vendors presented fundamentally different approaches: one offered a pre-developed, off-the-shelf product that would be customized and populated with local mobility service data. The other offered to combine different open source packages together to produce a new software product.

Each approach offered unique advantages and risks, and the evaluation panel found itself debating issues such as:

- Software ownership and licensing
- Customization, and longevity
- Knowledge of the local transportation context
- Realistic assessment of available data
- Pragmatism also became critical differentiators

The two most credible vendors presented fundamentally different approaches: one offered a pre-developed, off-the-shelf product that would be customized and populated with local mobility service data. The other offered to combine different open source packages together to produce a new software product.

Although the decision was not easy, the City ultimately contracted with Interline Technologies, with subconsultant Lab Zero as the Commuter Wallet development team to produce a unique software product.

Development Process

The Commuter Wallet development process consisted of four key phases:

1. **Design Sprint** – Onsite meetings at each pilot partner site about their commuting habits were held for the purpose of informing critical and desired functions of the Commuter Wallet. The project team viewed the Design Sprint as an innovative method to quickly finalize the specifications of the Commuter Wallet.
2. **Production and Deployment of a Minimum Viable Product (MVP)** – The MVP contained two primary user-facing functions—an intermodal, real-time trip planner that included walk-to-transit, bike-to-transit, and drive-to-transit directions and a description of all commute benefits eligible to each employee, based on the benefits offered by their employer.
3. **Deployment of Subsequent Features** – Interline added the backend trip logging integration with the RideAmigos platform, adjusted the trip planner to prioritize the display of non-driving modes, linked eligible commuter benefits to specific trip plans as a means to educate the employee, allowed an employee to save their favorite locations, incorporated transit agency Twitter alerts into the user interface, added a real-time in-app messaging support feature, and added a reporting interface for pilot site managers.
4. **Maintenance and Deployment of the Application** – The project team actively engaged pilot site managers before, during, and after the Commuter

Wallet deployment. Lab Zero prepared introductory/walk-through videos and e-mails describing the application, and pilot site managers incorporated Commuter Wallet messaging into their weekly pilot employee e-mails and meetings.

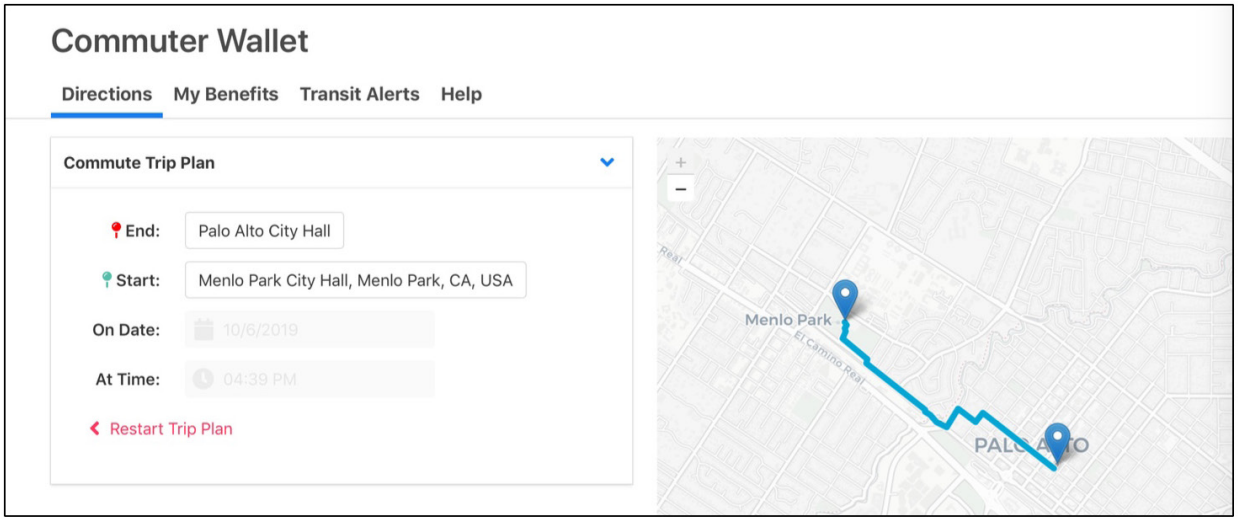


Figure 2-8

Commuter Wallet example real-time trip planning feature (MVP version)

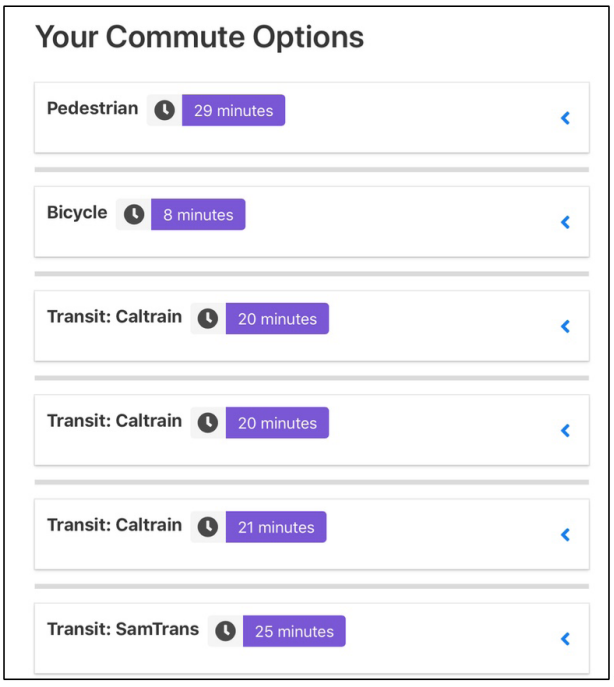


Figure 2-9

Commuter Wallet example real-time trip plan list (MVP version)

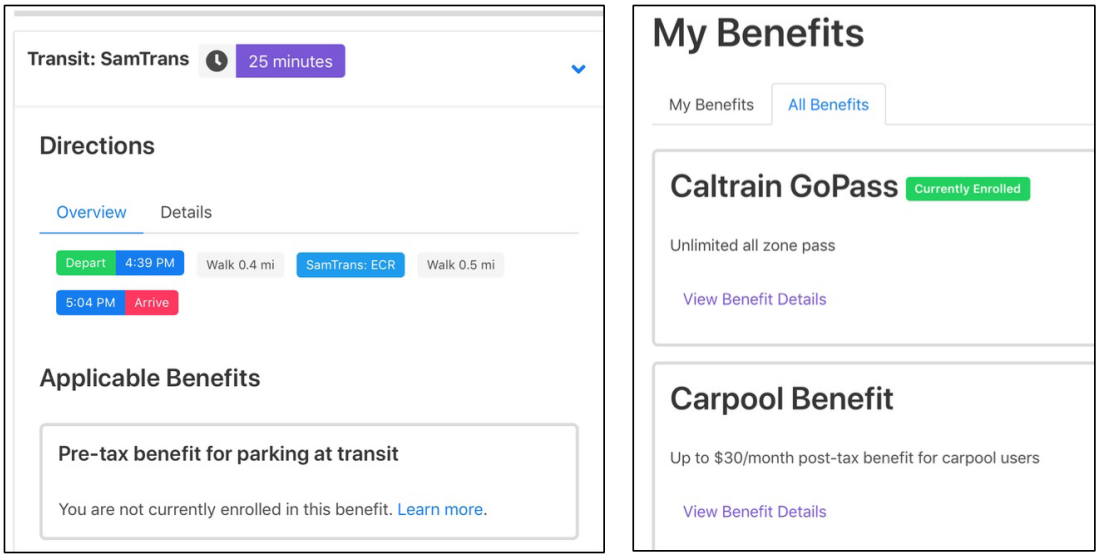


Figure 2-10

Commuter Wallet commuter benefits feature (MVP version) – applicable benefits per trip (left), options to enroll in eligible benefits (right)

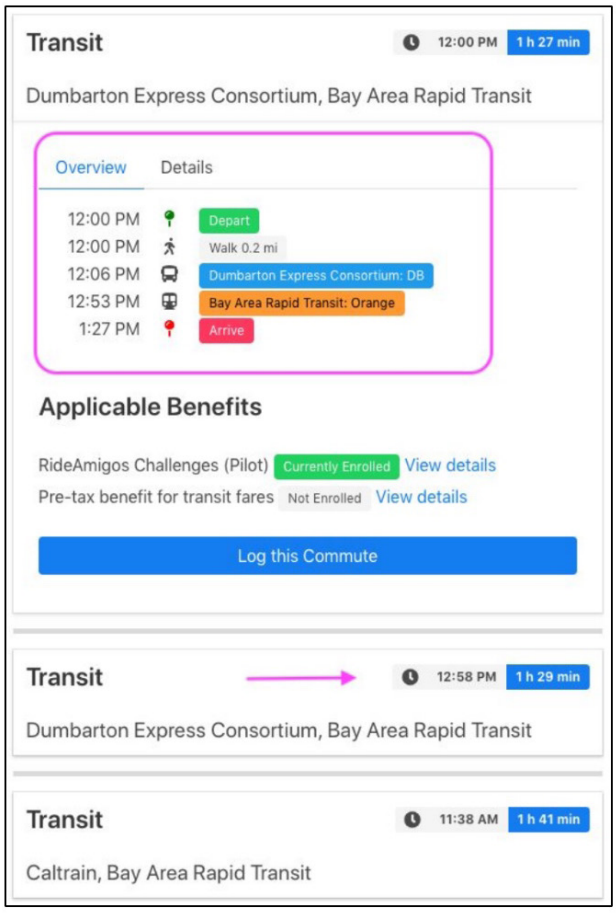
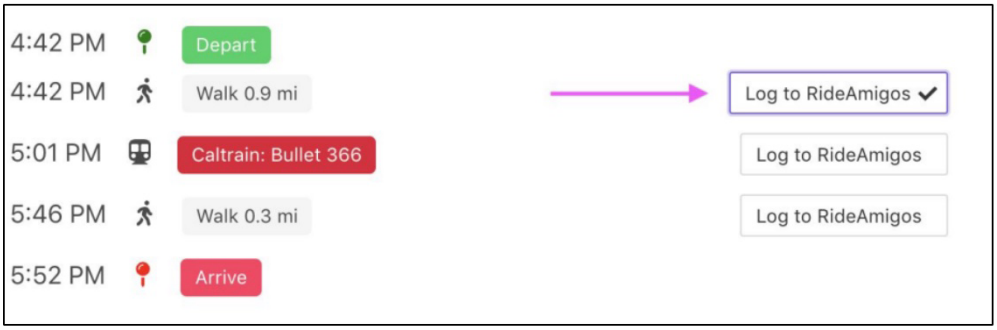


Figure 2-11

Commuter Wallet trip itineraries prioritizing transit (Version 2)

Figure 2-12

Commuter Wallet multi-leg trip logging integration with ECTR



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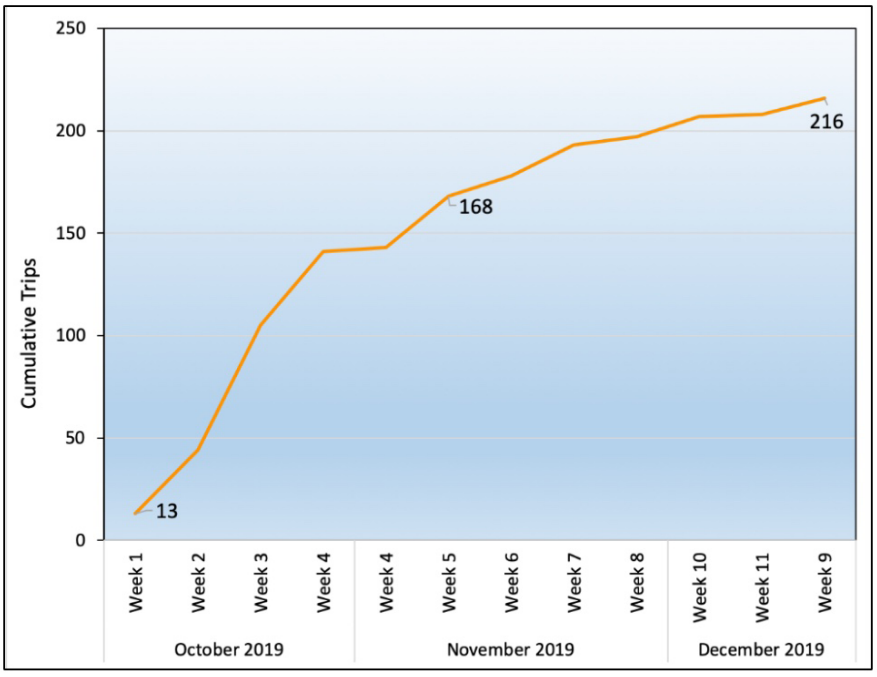
Commuter Wallet Outcomes

Despite the high rate of communication, application performance, and successful integration with RideAmigos, employee adoption rates of the Commuter Wallet were generally low. Pilot site managers noted that some of their employees were confused by overlapping features between the Commuter Wallet and the RideAmigos platform or were resistant to learning another new application after having learned how to use the RideAmigos platform. The project managers attempted to address feedback by better explaining the differences between platforms—the Commuter Wallet offered real-time intermodal trip planning and understanding commute benefits, whereas RideAmigos was used for logging trips and participating in challenges.

Ultimately, over the three-month period of Commuter Wallet operation, 23% of pilot employees used the Commuter Wallet, generated 216 trip plans, and saved 19 commuter benefits on the platform to follow-up for enrollment through their Human Resources department.

Figure 2-13

Total trip itineraries planned using Commuter Wallet



At the conclusion of the pilot, pilot site managers had mixed reactions to the Commuter Wallet. An integrated, single platform and a sustained program that would allow more evenly-spaced communication over a longer period of time might provide more positive results. It would have been ideal to start the Commuter Wallet procurement process earlier, perhaps in parallel with the pilot partner procurement effort. In hindsight, it would have been beneficial to roll out both the ECTR and Commuter Wallet at the same time to avoid software fatigue and allow time for additional feature set enhancements over the duration of the project.

Positive feedback included the educational value and convenience of seeing all applicable commute benefits in one place, and the success of the trip logging integration with RideAmigos. Negative feedback centered around insufficient differentiation and juggling between platforms, "communication fatigue," in which there was simply too much activity going on in the midst of the entire pilot program, including Commuter Wallet updates, and additional communications on top of everything else.

Given resource and process constraints and the uncertainties involved throughout, it is perhaps remarkable that the procurement process still resulted in an excellent software development team with which to work that was able to produce a viable product in a short amount of time. The project team was satisfied with how responsive the development team was to work with and how both Interline and RideAmigos were able to work with each other to produce the backend trip logging integration. The successful collaboration between these two software vendors is a testament to shared values and highlights the importance of partnerships to drive change.

Additional Project Deliverables

The FVC project delivered three independent tasks that provided resources and lessons learned for its pilot partners and the national MOD Sandbox audience. These documents share learnings and recommendations that could also be cited and used to scale or modify existing commute programs or create new supportive policies and programs.

SPUR White Paper

SPUR was commissioned to produce a white paper examining the role of public policy in supporting FVC pilots and shifting workers out of drive-alone commutes. The paper outlined many of the underlying factors that shape the challenges the FVC project aimed to address.

Independent Investigation: Gap Analysis

ProspectSV produced a Gap Analysis memo that presented recommendations for reducing or filling first/last-mile gaps identified through an analysis of employee home and work locations. The analysis sought to answer the primary question, "How many employees would have a reasonable transit commute compared to driving if they were to have access to a micromobility mode?"

Independent Investigation: Palo Alto Transportation Management Association

Palo Alto contracted with PATMA to participate in the "Systemic Obstacles" components to the extent they related to equity and accessibility. PATMA offered transit subsidies to up to 240 low-income workers who would otherwise not receive subsidies, investigated and reported on additional gaps faced by low-income commuters, recorded technical barriers faced by transit riders when administering the subsidy program, and proposed solutions to fill identified gaps, including addressing technical barriers.

SECTION

3

Project Evolution

The original FVC project landscape consisted of a 23-member consortium and 8 project supporters including local cities, counties, transit agencies, non-profit organizations, employers, rideshare vendors, and planning agencies. The proposal included an 11-pilot-partner project from both the private and public sectors, all of which would run in demonstration mode for up to one year. The project also consisted of eight gap analysis and two ECTR vendors. FVC started out with good intentions, but the team quickly found that it was challenging to run this type of project.

Public-Private Partnerships

The FVC project is a complex multi-dimensional project that required multiple partnerships with local governments and technology companies. Managing the expectations, dynamics, different pace, and working styles of these two types of organizations was challenging. Local governments are less agile than nimble, innovative startup or technology companies. Local governments place emphasis on policy, enforcement, public interest, and the process of decision- and resolution-making. Ultimately, this means governments tend to move at a slower pace than what is typically seen in business-to-business relationships. Startups or technology companies, on the other hand, move rather quickly, as dictated by their business models. It is in their nature and best financial interest to set strategy, innovate quickly, and produce services or products in an efficient and timely manner; the success of their business depends on this model. The juxtaposition of these models led to interesting insights on partnerships as well as a deeper understanding of what it takes to truly make public and private partnerships function. To keep the project on track and moving forward, it was critical that these two very different models and organizational cultures learn to work collaboratively together.

The FVC project is a complex multi-dimensional project that required multiple partnerships with local governments and technology companies. Managing the expectations, dynamics, different pace, and working styles of these two types of organizations was challenging.

Replacement of Principal Investigator

The relationship between Palo Alto and the original Principal Investigator (PI) broke down due to differences in management styles as well as project

expectations; Palo Alto replaced the PI so the project could remain viable. In going through the replacement process, Palo Alto initially cast a nationwide net to test the market but subsequently decided it was best to seek out an organization that was located in the Bay Area and understood the transportation nuances and challenges of the region. As part of the replacement process, the City developed a rubric consisting of five key criteria to assess both organizational capacity and best cultural fit for this replacement. The criteria were based on:

- Ability to implement
- Ability to develop and sustain relationships
- Software development experience
- Mobility subject matter expertise
- Familiarity with federal research grants

Replacement of ECTR Vendor – Assessing Risk

In addition to replacing the original PI, FVC also replaced one of its ECTR vendors. Luum was founded and operates in the context of the transit-friendly Pacific Northwest. It has a sophisticated business model and is known for helping large Seattle-area employers reshape the commuting habits of their employees through the use of incentives and disincentives. However, the company found it challenging to work with local governments in the California market, largely due to the lack of gated parking infrastructure and lack of widespread policy for charging for parking. Ultimately, Luum decided it did not have the operational bandwidth to see FVC through and decided to end its relationship with FVC.

Luum found it challenging to work with local governments in the California market largely due to the lack of gated parking infrastructure and lack of widespread policy for charging for parking.

As a result of this loss, the project needed its sole ECTR vendor, RideAmigos, to support the entire project to the finish line. RideAmigos was founded in Southern California, and the company understands the car-loving culture of California, so it seemed this would be a natural fit. However, undertaking this type of risk was a serious business and strategic decision for the self-funded company. After several months of conversations, negotiations and risk/reward assessments, RideAmigos agreed to serve as the sole ECTR vendor. In the end, RideAmigos was an excellent cultural fit for this project, the company's technology allowed for full functionality even without parking gates, and RideAmigos was instrumental in working with the pilot sites to reduce SOV.

Table 3-1
ECTR Vendor Risks and Rewards

Risks	Rewards
• Reputational damage due to project failure • Lost research and development time • Sunk costs • Bandwidth constraints • Staffing challenges	• Exposure to new markets • Direct access to high-profile city governments in heart of Silicon Valley • Opportunity to participate in FTA MOD Sandbox • Collaboration with FVC project team • Potential for partnerships beyond pilot • Real-time feedback on software functionality • Integration with the Commuter Wallet platform

Restructuring the SOW

While many pilot sites expressed interest in testing FVC as a tool to reduce SOV, they lacked in-house bandwidth to support the project without a high-touch approach from the project team. Given these resource challenges and to ensure that the project would proceed to demonstration, the project team created a scaled-down model that worked more closely with a smaller number of pilot sites. Within this new model, Palo Alto restructured the number of participating pilots from 11 to 4–11 and the gap analysis locations from 8 to a range of 1–3. The City recommended this scaled-down approach to ensure a successful project as well as a case study for other regions that were interested in using, adapting, and scaling these initiatives within their unique circumstances. The flexibility to restructure the SOW allowed FVC to proceed to demonstration.

Adaptations in Pilots – Different Motivations + Requirements

In its original form, FVC included both public and private sector pilot sites, but many factors were involved in adapting the pilots to only public sector pilots.

Large Private Sector Employer – Bay Area

Large private sector Bay Area employers already offer significant commute programs that are primarily focused on providing their own shuttle bus services and have committed to investing large amounts of money in offering these services. Additionally, competition for employees is fierce, particularly among tech employers, and any perceived disadvantage in benefits (especially a disincentive such as a parking charge) would cast the company unfavorably. Major established TDM programs in certain parts of the Bay Area exist primarily as a result of local government regulations in the form of land-use permits (Stanford University and Stanford Research Park) and trip caps (Apple in Cupertino, Google in Mountain View North Bayshore, Sunnyvale Moffett Park, Facebook in

Menlo Park). As a result of these factors, the large private sector employers were hard-pressed to find value in participating in FVC.

Small Private or Public Sector Employer – Bay Area

Absent regulations or trip caps, smaller employers have less incentive to monitor their employee transportation patterns and have more incentive to provide free parking as part of their attempt to attract and retain workers. Additionally, smaller organizations without current TDM programs often do not have the resources to partner on a pilot. As a result, these organizations would not be able to easily build and scale TDM efforts unless efforts were coordinated through a Chamber of Commerce, a small to mid-size business alliance, or a TMA.

Public Sector Employer – Bay Area

In a government setting, pilots or temporary commitment of resources is often the only way to launch a desired new program to build momentum for subsequent, more sustainable, longer-term support. For this reason, public agencies were motivated to participate in the pilots. The City of Palo is a public employer and had worked successfully with neighboring jurisdictions on other cooperative projects, so the project team decided to complete the cohort with only municipal employers. Doing this allowed the project team to focus and generate learnings that were specific to municipal employers, such that eventually these learnings could also be applied broadly by the cities to many other local businesses through city land use authority.

In a government setting, pilots or temporary commitment of resources is often the only way to launch a desired new program to build momentum for subsequent, more sustainable, longer-term support.

Change in Self-Funding Business Model – Feebate Foundational Work

Implementing a feebate is a way to incentivize both employers and SOV commuters. It creates a self-funding, scalable, and sustainable business model that helps subsidize employee commutes and reduces employer costs. However, a feebate model requires a significant restructure in policies, capacity, and infrastructure. Due to the limitations and hesitations associated with a feebate, FVC was unable to implement this concept. Organizations of all types should consider the following before implementing a feebate:

- **Policy barriers to parking charges** – Understand any policy barriers to charging for parking. Particular to the municipal pilot partners, free parking is a union-negotiated employee benefit and a sensitive subject among Human Resources departments. Free parking is also a perk for private

sector employers. Employers who provide free parking may lack the ability to enforce new parking policies given a lack of equipment or operational resources.

- **Technical capacity** – Understand the value of a parking space. Many employers do not have technical capabilities to charge for parking and do not understand the cost and value of employer-provided parking and how it relates to other commute subsidies and incentives. FVC worked on developing cost/benefit analyses of employer-provided employee parking vs. non-employer-provided parking as a tool to show employers the ramifications of offering free parking.
- **Infrastructure** – Understand what infrastructure is needed for a tracking and enforcement mechanism. A feebate model requires a means to track parking, whether through gated parking, an employee-paid monthly or daily parking pass or permit, or some alternative type of tracking. It also requires an enforcement mechanism such as parking enforcement or a license plate reader.
- **Equity** – Understand how all income levels will be impacted by a parking charge. When establishing a feebate, it is important that employers understand how elimination of a free parking benefit will impact employees of all income levels. Often, the lowest earners are negatively impacted, which becomes an unintended consequence of a policy change.

With even a small parking cashout, employees were willing to try and sustain alternative commutes throughout the demonstration.

FVC worked with pilots on a parking cashout model that incentivizes or subsidizes non-SOV commutes and does not charge for SOV commutes. With even a small parking cashout, employees were willing to try and sustain alternative commutes throughout the demonstration.

Commuter Wallet Evolution – From Book, Ride, Pay to Explanation of Benefits

In designing the Commuter Wallet, the original FVC champions favored using a MaaS platform to blend universal trip planning and payment, as has been demonstrated in Scandinavian cities such as Helsinki, Finland, and Gothenburg, Sweden. However, market research and conversations with regional industry experts revealed different priorities and regional constraints. It was determined that a MOD approach would be a better fit for the Commuter Wallet due to the fragmented mobility ecosystem in the Bay Area.

Table 3-2

MaaS vs. MOD Commuter Wallet Models

MaaS Commuter Wallet Model (Book, Ride, Pay)	MOD Commuter Wallet Model (Explanation of Benefits + Real Time Intermodal Trip Planning)
• Expected to operate an entire mobility ecosystem, perhaps even for free, by generating revenue through user subscription fees. • Unaware of existing regional mobility payment constraints. • Did not wish to target employees located beyond their intended service area. • Resistance to incorporating employer subsidies or benefits or required substantial modifications to incorporate employer benefits or subsidies and to integrate with ECTR. • Did not offer pre-negotiated data integrations with private mobility providers.	• Built custom, robust demonstration of desired integrations, even if total feature set or mobility provider set not as complete as on commercial app platforms. • Produced with real-time, intermodal trip planner (between walk, bike, drive, transit). • Targeted employees regardless of service area. • Complete database of employer benefits linked to real-time intermodal trip plans. • Integration with ECTR platform enabled trip logging from Commuter Wallet user interface.

Leadership Changes

In addition to the modifications to the PI, ECTR vendor, and SOW, FVC weathered significant leadership changes within Palo Alto; the Palo Alto City Manager, Chief Sustainability Officer, and Chief Transportation Official all departed during the project. These changes in leadership and subsequent changes in strategy did not cause the project to collapse because there was support from other jurisdictions and a strong desire to test a pilot that would potentially reduce SOV.

SECTION

4

Evaluation

The Independent Evaluation Team, consisting of the UC–Berkeley Transportation Sustainability Research Center (TSRC), Booz Allen, and ICF, drafted and completed an FVC Demonstration Project Evaluation Plan (Report No. FHWA-JPO-18-697) in December 2018 that proposed nine hypotheses and related metrics based on the stated project goals. The nine hypotheses were informed through several data types and elements, including survey data, commute activity data, employee data, public transit ridership data, feebate or cashout data, gap filling data, and stakeholder interviews. The Independent Evaluation Team provided a detailed evaluation report, and the qualitative observations in Table 4-1 are offered based on the project team's experience.

Table 4-1

FVC Hypotheses and Preliminary Observations

	Hypothesis	Preliminary Observations
1	Mode share of commuting by SOVs for both participating employees and the broader population declines as a result of the FVC solution. This mode share is defined as a function of trips.	Based on the ECTR trip logs, 56 participating pilot employees logged 4,918 alternative trips over approximately a six-month pilot (approximately 15 alternative trips per person per month of 40 average total trips per person per month). However, it is unclear whether that trip volume will significantly alter the overall mode share when compared to all other trip making by all employees.
2	Total commute VMT for participating employees and the broader population declines.	In total, 42% of the alternative trips logged were on transit, 25% were by carpool, and 7% were by walk; there should be a decline in total commute VMT for participating employees.
3	Total energy consumption and CO2-e emissions from participating employees and the broader population declines.	Total energy consumption and CO2-e emissions should decline because of the shift from SOV to more energy-efficient modes. Particularly helpful in this regard are the 26% of alternative trips logged by bike and 7% by walk.
4	FVC benefits lower-income workers more than higher-income workers.	Results are inconclusive. Lower-income workers at pilot employers might benefit more if they spend more of their income on transportation than higher-income colleagues because the pilot incentives or benefits could potentially reduce the cost of their transportation expenses.
5	Improved access to pre-tax payments increases public transit ridership.	FVC was not able to directly improve access to pre-tax payments through the Commuter Wallet platform. However, increasing the visibility of benefits (even existing ones) through the Commuter Wallet increased employee uptake of benefits. Further, some employees participated in pilot program benefits that were focused on increasing access to transit, including parking subsidies at transit stations.
6	The mobility aggregator, Feebate, or cashout policy and gap-filling analytics positively impact the propensity of commuters to use non-SOV modes.	Pilot partners were able to test most elements with demonstrated employee uptake of non-SOV modes. Only one partner could not test a cashout policy no a gap-filling fleet solution and relied on other elements of its pilot program to impact employee behavior.

Table 4-1 (cont.)

FVC Hypotheses and Preliminary Observations

	Hypothesis	Preliminary Observations
7	The attitudes of employees towards transit become more positive.	The attitude towards transit was mixed depending on the employer location. The final analysis will show any trends.
8	The commute feebate or cashout is financially-sustainable at participation rates achievable during or after the pilot.	FVC was unable to demonstrate the feebate mechanism due to the inability of any pilot partner to institute parking charges. However, FVC generated enough momentum at three of the four pilot partners to propose cashout beyond their pilot program. The fourth pilot partner could not test cashout but will pursue investigation into enabling parking policies.
9	The project produces a series of lessons learned that will be documented through expert interviews with project stakeholders.	FVC has successfully demonstrated that best practices, pitfalls, and lessons learned can influence commute behavior. These tools and tactics are integrated within the final report.

To draw the above conclusions and successfully launch the FVC demonstration, the project team facilitated the collection of data through various means, including:

- Deploying a baseline survey and a follow-up survey to both participating and non-participating employees at each of the four pilot partners
- Providing commute activity data collected from the ECTR and Commuter Wallet platforms
- Providing cashout data collected through the ledgering process
- Providing the results of the Gap Analysis

Key components in the evaluation process were the pre- and post-pilot surveys largely designed by UC–Berkeley. The project team sought to streamline the survey and recruitment process and used the pre-pilot survey as an opportunity to help recruit pilot participants at each pilot employer. To protect respondent anonymity and still recruit for pilot participants, FVC appended a separate "mini-survey" to the primary UC–Berkeley survey instrument to gauge interest in participation.

The survey process required a fair amount of coordination and communication, and the project team worked collaboratively with the pilot sites to refine the survey content and process. Each pilot left the survey open for two weeks, and FVC offers the following the process roadmap for large-scale survey deployment:

- Sample pilot partner introductory e-mail to employees
- Email introduction to pilot employer employees containing custom survey link per employee
- MOD Qualtrics survey (opening page), administered by UC–Berkeley
- MOD Qualtrics survey (long consent form page)
- MOD Qualtrics Survey (consent form page)
- MOD Qualtrics survey (thank you/closing page)
- Mini-survey that immediately follows the MOD survey
- Reminder email content

The pre-pilot survey results showed a higher percentage of response than the post-pilot survey results. However, at least 20% (if not more) of responses were received from each pilot site for both the pre- and post-pilot surveys.

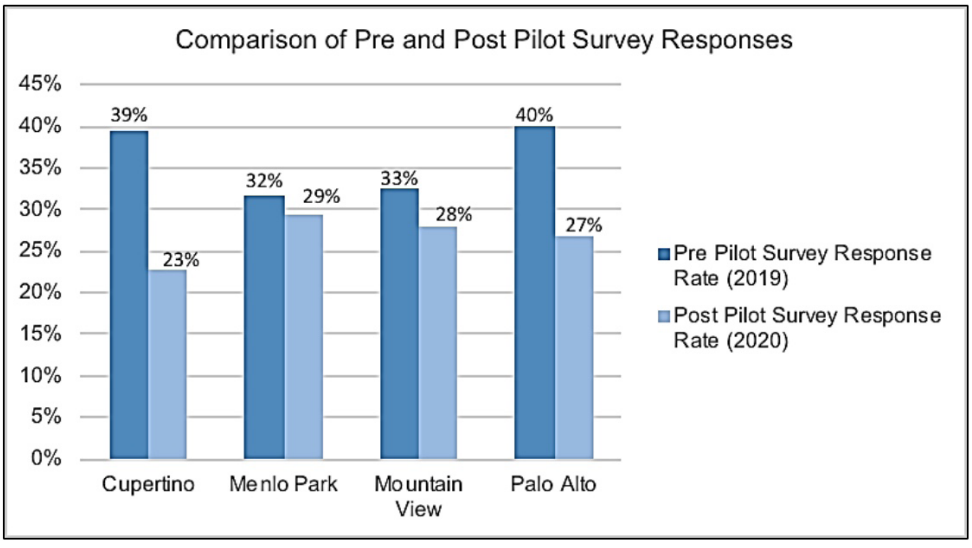
Table 4-2

FVC Hypotheses and Preliminary Observations

	Pre-Pilot Survey Response Rate			Post-Pilot Survey Response Rate		
City	*Total Employees Surveyed*	*Number of Responses*	*Response Rate*	*Total Employees Surveyed*	*Number of Responses*	*Response Rate*
Cupertino	183	72	39%	184	42	23%
Menlo Park	256	81	32%	253	74	29%
Mountain View	601	196	33%	601	168	28%
Palo Alto	396	158	40%	408	109	27%

Figure 4-1

Comparison of pre- and post-pilot survey response rates by pilot partner



SECTION

5

Conclusion, Lessons Learned, Recommendations, and Next Steps

Conclusion and Lessons Learned

The FVC pilot demonstration set out to reduce SOV commutes in the Bay Area and address wide-scale systemic challenges along the way. Throughout the course of the FVC research and demonstration project, the FVC project team delivered four city employer FVC pilot demonstrations that used the ECTR and Commuter Wallet software platforms. The FVC project team established a high-touch approach by creating tailored training materials and working closely with each pilot employer to assess the strengths and weaknesses of their respective commute programs. This method proved to be successful, and during the onboarding and demonstration phases, each pilot employer had the opportunity to:

- Baseline, benchmark, and improve upon existing processes.
- Push the boundaries of existing commute programs and benefits.
- Consider the possibilities of policy changes.
- Create innovative behavior change campaigns.
- Collaborate with the multi-city pilot cohort.
- Determine which aspects of FVC were readily operationalized within their organizations and which aspects needed additional consideration.

Figure 5-1

Cumulative pilot results

Over the six-month pilot period, participating employees logged 4,918 alternative trips, traveled 84,072 non-SOV miles, burned 502,365 calories, saved 41,186 pounds of CO_2, and saved $21,046 in avoided auto-related travel expenses. Of all alternative trips logged, 42% were by transit, 26% by bike, 25% by carpool,

and 7% b walking (see Figure 5-2 for cumulative trips logged by mode). From an implementation standpoint, these figures are remarkable given the relatively small employee population. Even in the Bay Area, public sector employees were able to change their behavior with relatively small nudges.

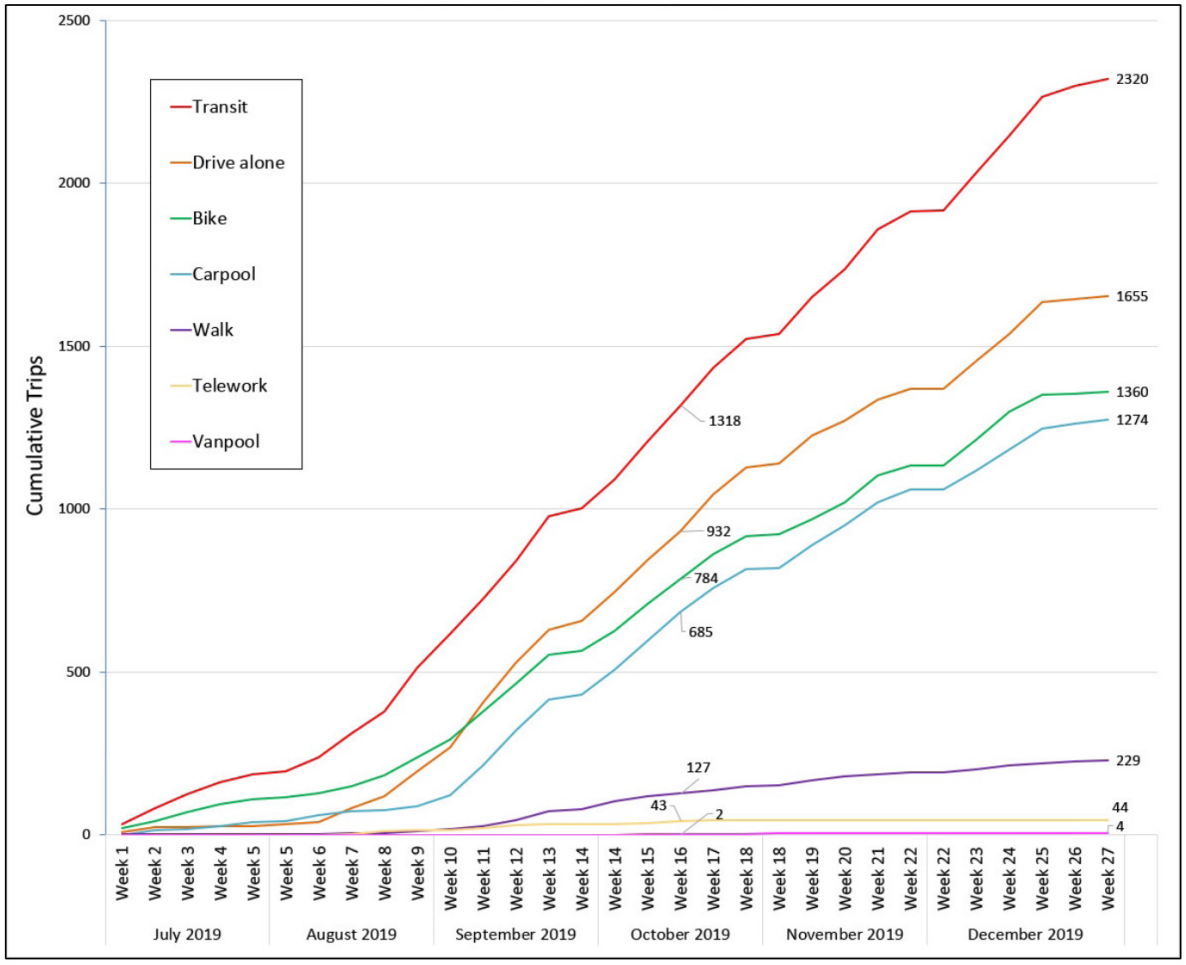


Figure 5-2

Commute trips logged in ECTR by primary mode

Giving up Parking Benefits is Difficult

FVC was unable to establish a feebate mechanism for using parking revenues to fund non-SOV, which is the key component that allows for economies of scale and creates a self-funding/self-sustaining non-SOV ecosystem. FVC discovered that getting both private and public sector employers to give up

A modest monetary investment in direct incentives or commute benefits—$5,000 or less—per pilot site spread over a period of six months resulted in substantial alternative trip-making.

parking as a benefit is difficult due to existing policies and common practice. However, a modest monetary investment in direct incentives or commute benefits—$5,000 or less—per pilot site spread over a period of six months resulted in substantial alternative trip-making. FVC also found that funding even small amounts for sites to partially build and run a pilot program acted as a catalyst for pilot partners to join the partnership.

Technology

Two key components of FVC—ECTR and Commuter Wallet—relied on technology to support mode shift and behavior change. During the demonstration, FVC showed that technology was valuable in supporting both of these efforts, and the project team tested the possibilities and limits of incorporating additional technology during the project's demonstration phase.

The ECTR, RideAmigos, was clear and easy to use and was a fun way to engage employees and offer insights on commuting behavior for managers to make the business case to executive leadership. RideAmigos offered a good graphical interface and a good personal dashboard with metrics for alternative trips, alternative miles, CO_2 emissions reduced, and money saved. The dashboarding feature encouraged competition. From an administration standpoint, ECTR was essential to the FVC program because Human Resources and executive leadership would not have approved the pilot program without it due to validation/reporting concerns. However, because of backend ledgering shortfalls, administering any commute benefits was cumbersome and required an additional step in the form of manual spreadsheet calculations. The ECTR by itself was insufficient to demonstrate universal trip planning and payment.

The Commuter Wallet filled this gap by providing real-time, intermodal trip planning capabilities, and it also enhanced education by bringing specifically-relevant commuter benefits into the user interface. These functions are rarely presented together in other applications. The Commuter Wallet and ECTR trip logging integration demonstrated the ability for platforms to be complementary. In real use, both platforms functioned correctly, which was a big step toward demonstrating universal trip planning. Through a successful integration with the project's ECTR vendor, RideAmigos, the Commuter Wallet demonstrated enterprise-level feasibility of integrating features that support a path toward real-time, intermodal trip planning and payment methods.

The FVC project validated that existing software solutions, even ones that perform well and are successful in the marketplace, are not comprehensive enough to satisfy the range of MOD functions needed by busy commuters.

The FVC project validated that existing software solutions, even those that perform well and are successful in the marketplace, are not comprehensive enough to satisfy the range of MOD functions needed by busy commuters. Specific gaps identified include:

- Real-time intermodal trip planning and logging of trips in the ECTR
- Awareness of eligible commute benefits
- Linking the universal trip planning app directly to disbursement of benefits through a ledgering process

Finally, as the lead on FVC, Palo Alto was responsible for the Commuter Wallet. The City is leveraging from the FVC project that a local government is not well-positioned to champion an independent technology solution, even with strong partners; however, the FVC project has left the City well-informed to monitor the market as technology options continue to evolve from the private sector.

Equity + Accessibility

Palo Alto contracted PATMA to participate in the "Systemic Obstacles" components to the extent these components related to equity and accessibility.

In a region where large corporations provide their own TDM programs and transit subsidies for their employees, PATMA recognized that the employees of small, main-street retailers receive no comparable benefits but often suffer from longer commutes due to affordable housing challenges. Therefore, PATMA has implemented its mission to reduce SOVs in Palo Alto by providing transit subsidies to service workers in downtown Palo Alto. Although Silicon Valley's technology professionals enjoy some of the highest wages in the nation (median annual pay at Google is $200,000 and at Facebook is $240,000), the majority of PATMA's participants earn $25,000–$45,000, with a median income of $31,200 and a mean income is $31,440.

PATMA's transit pass program provides monthly transit passes on four public transit operators, each of which is compliant with the Americans with Disabilities Act (ADA). Along with the operators, PATMA provides assistance to passengers with disabilities in obtaining the information they need. Outside of the transit pass program, they also may avail themselves of paratransit services.

Through its participation in the FVC, PATMA offered transit subsidies to 240 low-income workers who would otherwise not receive subsidies. The average cost of transit passes on systems serving Palo Alto is about $133 per commuter per month. PATMA works first with store managers who disseminate program information to their workers. Once a worker applies for the program, PATMA works directly with them to provide a Bay Area Clipper transit fare card and then electronically add transit passes to their card every month. In total, 66 of 300 downtown Palo Alto businesses participate in the program.

To support the FVC project's research, PATMA investigated and reported on additional gaps faced by low-income commuters participating in its subsidized transit pass program. The commute challenges of service workers are considerably different than those of more affluent corporate commuters with more stereotypical office jobs. PATMA found the three greatest challenges the following:

- **Turnover** – The official Bureau of Labor Statistics turnover rate for the restaurant sector was 81.9% for 2015–2017, but industry estimates nationwide are much higher. In Palo Alto, where high housing prices necessitate longer commutes for lower-wage workers, some downtown businesses report a 200% annual turnover of employees (16% each month). PATMA identifies this as a challenge to incentivize workers reluctant to commit to a program affiliated with a job to which they may not be committed. Furthermore, the program relies on store supervisors to administer the transit subsidies for front-line employees; when those supervisor positions turn over, the program's human infrastructure for deployment is undermined. These challenges require PATMA to operate a less-efficient, high-touch program that refreshes recruitment regularly.
- **Commute hours** – Many restaurant, bar, and hotel employees work shifts that are not aligned with transit operations designed to support a traditional work day. Employees getting off work at 3:00 AM do not have access to convenient train or bus service; when they do, they are less likely to feel safe walking the first or last mile between bus service and their place of work or home. PATMA's program is necessarily limited, for the most part, to service workers who are able to perform their jobs during more traditional commute hours, as shown in Figure 5-3.

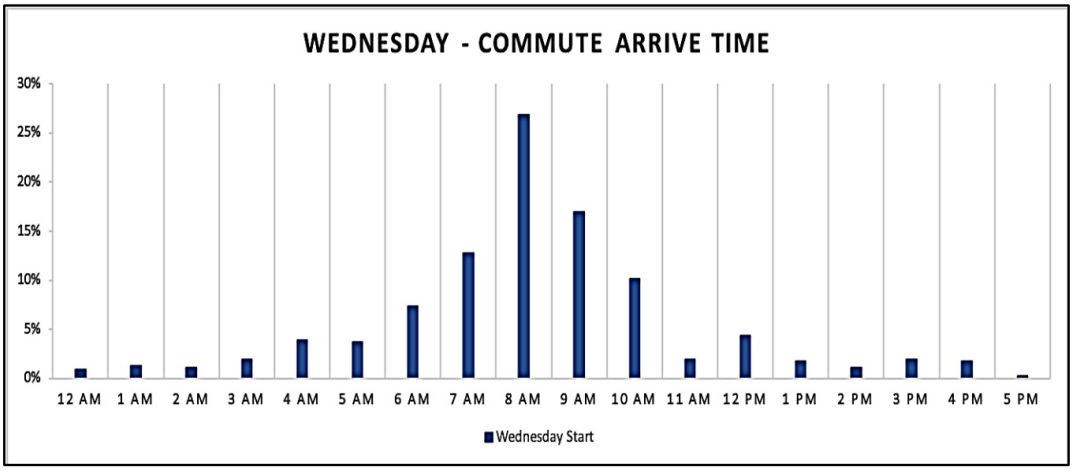


Figure 5-3

Example commute hours for PATMA participants

- **Trip chain complexity** – Through interviews and surveys, PATMA has found that 56% of surveyed Palo Alto service workers need to drive to work because they make other stops. In addition to the challenges of school drop-offs and daycare pick-ups described by transit riders across sectors, service workers are more likely to be either students balancing class schedules with work schedules or persons working multiple jobs to make ends meet, particularly in the high-cost Bay Area. These employees are less likely to successfully find practical transit solutions to multi-part trips that change from day to day and shift to shift.

In addition to these challenges, PATMA identified technical barriers faced by transit riders when administering its transit subsidy program. PATMA's program is labor-intensive and prone to both human and technology errors. Each month, about 15% of Caltrain monthly pass commuters "tag on" but do not "tag off," resulting in erroneous negative account balances that can result in $75 citations. PATMA intervenes on behalf of commuters to remedy negative balances and has also successfully appealed Caltrain citations on behalf of its program participants. This is another example in which human behavior must be considered when designing automated systems such as payment cards and associated software.

Although transit systems are designed to support the needs of many mobility-impaired members of society, PATMA fills a unique niche to address the equity challenges of low-income service workers who otherwise would not enjoy the types of transit benefits provided by larger corporate employers.

Recommendations

Solutions to commute challenges must be tackled systemically at local, cross-county, regional, or statewide scales, and doing so requires creating and sustaining partnerships, policy adaptations, investment in software solutions, micromobility solutions, and incentives.

Partnerships

Multi-sector partnerships are difficult but incredibly important to public policy, and the time spent building trust within the project team and among pilot partners was well worth the effort. Organizational culture is a significant factor when pursuing behavioral change. Making the business case for programming and solutions was not "one size fits all" and varied substantially in messaging, policy, setup, deployment, and execution. This underscores the significant, albeit indirect, value to be gained through communication and networking among partners as they each seek to build or expand TDM programs of their own.

Policy Adaptations

In the case of FVC, a regional baseline parking charge could level the playing field for employers and potentially provide a powerful tool in the ongoing effort to stem drive-alone commute rates. TDM programs are one example of how governments will increasingly need to compete with the private sector for talent. A regional mandate to help employers expand the commute options for their workers through providing greater incentives to carpool, better communication of benefits, and more could go a long way in shifting workers out of drive-alone commutes. The FVC project provides an example of how government and non-profit employers can take the first steps in this direction and invest in benefits for their own employees related to community goals such as traffic reduction and environmental preservation and by subsidizing transit benefits for other low-wage workers in their communities.

Software Solutions

Larger-scale investment in software such as ECTR and Commuter Wallet-type applications can dramatically reduce the effort and cost of procuring one-off software licenses and promote regional interoperability. The FVC project was able to provide software for free to its pilot partners, immediately removing multiple procurement obstacles. Commute.org is a larger-scale example that purchased an ECTR license to cover all 3,500 employers in neighboring San Mateo County. A single license could cover all employers in the Bay Area region or the state of California. Government investment and/or cooperative group purchases could be avenues to pursue.

> **"After this pilot ended, [I] continue to carpool as opposed to driving alone before. While there is some incentive now, it is not as much as the pilot. However, I believe that spreading awareness of these commute alternatives, along with flexibility of both my coworkers and supervisor for work hours, allowed me to take advantage of "going green" and be rewarded with the most valuable commodity, time."**
>
> **—Pilot Participant, City of Menlo Park**

Micromobility Solutions

The Gap Analysis demonstrates that there is high potential for micromobility to expand the base of commuters who could use micromobility to connect to transit. Transit agencies, municipalities, employers, and mobility providers should be encouraged to act as supportive stakeholders, whether they adopt enabling policies, subsidize or provide complementary mobility services, or advocate for safe street conditions. Accessibility solutions for those unable to ride scooters or to bike or walk must continue to be a priority when designing micromobility solutions.

Incentives

A modest monetary investment in direct incentives or commute benefits—$5,000 or less per pilot site spread over a period of six months—resulted in substantial alternative trip-making. As employers prepare to launch their own TDM programs, they should budget for personnel to champion and market the desired behavior changes as well as funds for modest incentives to seed the program. The feedback and behavior from pilot participants validated the theory that incentives do not need to be financially large to drive behavior change. The idea of a prize or discount can motivate behavior change; this concept is familiar to local governments that have passed ordinances to charge a modest five cents for plastic grocery bags to encourage shoppers to buy and use reusable canvas bags.

The idea of a prize or discount can motivate behavior change. This concept is familiar to local governments that have passed ordinances to charge a modest five cents for plastic grocery bags to encourage shoppers to buy and use reusable canvas bags.

Next Steps

Looking forward, each pilot partner is already building upon the experiences gained during the FVC project. The partners are approaching their transition differently, with varying blends of policy change, process improvement, employee education, and/or program expansion. Some are continuing use of the ECTR, and others are planning to expand their gap-filling fleet. All are interested in pursuing some type of expansion of commuter incentives or benefits. In many cases, pilot participants are continuing to commute by non-SOV.

Pilot partners were asked about their next steps post-pilot; some of their specific action items are as follows:

- The **City of Cupertino** applied for and received funds from a County "Healthy Cities" grant program to continue using the RideAmigos platform and administering the pilot program as originally launched. The City also will obtain more e-bikes for its e-bike loan program. City staff plan to use the pilot results, including RideAmigos data, to make the case for a permanent employee commute incentive program.
- The **City of Palo Alto** has created a temporary, two-year position to continue the TDM work for City employees that was tested during the pilot project, is investigating a new vanpool subsidy program offered by the regional Metropolitan Planning Organization (MTC) and has reached out to the City's Purchasing Department for guidance. It is also discussing the potential buyout of existing employee parking passes and is looking to expand its walk-to-work benefit to include walking to transit as well as surveying employees for interest

in transit pass subsidies for employees whose work location is located beyond the immediate area around Palo Alto's downtown Caltrain station. As the City begins to partner with regional leaders like the MTC to invest in regional TDM solutions, it will continue to build on its new relationship with commute.org and with neighboring cities to explore TDM partnering opportunities in the future to seek shared resources and economies of scale and to share best practices and new ideas on an ongoing basis.

- The **City of Menlo Park** is working with its Human Resources department and its Sustainability Division to jointly petition the City Manager and City Council to expand the budget for commuter benefits to offer a program similar to the pilot at a city-wide level. The goal is that commuter benefits would improve commuting in general, improve recruiting/retention of City employees, and offset unnecessary greenhouse gas emissions. The City will continue use of the RideAmigos platform because the license is covered under the commute.org countywide license for San Mateo County.
- The **City of Mountain View** is planning an event for early 2020 to promote alternate modes in which it will showcase its e-bikes for all employees to try and will display posters and flyers about its current commute benefits. The City is also considering setting up a vanpool program. It also is currently reviewing its existing commute benefits to determine what changes can be made to incentivize employees to select active commute modes, which reduce SOV trips and is looking at ways to integrate the benefits offered by Mountain View's TMA with commute benefits offered to employees.

Pilot partners were also asked, "If you had a magic wand, what would you do to improve your City's TDM program?" Their responses included the following.

Table 5-1

TDM Program Improvements

If you had a magic wand, what would you do to improve your City's TDM program?			
City of Cupertino	**City of Menlo Park**	**City of Mountain View**	**City of Palo Alto**
• Get transit to Cupertino, and charge for parking!	• More outreach about existing transit services. • More local transit within Menlo Park. • Having a dedicated person for commuter benefits who is knowledgeable about transit and connectivity in the Bay Area. • Fare integration and/or regional day pass/fare cap to make it more affordable for employees who live farther away and may have to transfer among the Bay Area's 27 transit agencies.	• Convene a regional effort to develop a plan that charts efficient public transit routes to make mass transit a viable commute option for many.	• Full-time commute coordinator utilizing and an app/ platform that is the marriage of the RideAmigos and Commuter Wallet platforms and the funds to support it.

In closing, FVC has shown that systemic barriers still need to be addressed to effectively create large-scale, self-sustaining non-SOV funding models. However, as illustrated through the successful six-month multi-city demonstration project, commuting behavior change is possible even when incorporating only small incentives, using software platforms, effectively communicating employee benefits, and focusing on employee engagement. FVC encourages stakeholders in jurisdictions—local, regional, and national—to consider how the implementation of the five FVC concepts can reduce SOV commuting in their respective districts and communities.

ACRONYMS AND ABBREVIATIONS

CO_2	Carbon Dioxide
ECTR	Enterprise Commute Trip Reduction Software
FVC	Fair Value Commuting
GHG	Greenhouse Gas
MaaS	Mobility as a Service
MobAg	Mobility Aggregator Software
MOD	Mobility on Demand
MOU	Memorandum of Understanding
MTC	Metropolitan Transportation Commission
MVP	Minimum Viable Product
Palo Alto	City of Palo Alto
PI	Principal Investigator
ProspectSV	Prospect Silicon Valley
TMA	Transportation Management Association
VMT	Vehicle Miles Traveled

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APPENDIX

1

Benefit Reporting Process

MOD Benefits Ledgering System

Roles							
			This is the gap that needs to be filled				
Employees	**Commuter Wallet**	**RideAmigos**	**Determine Earnings**	**Reporting**	**Pilot Site Managers**	**HR/Payroll**	**Employees receive $**
Enroll in specific benefits	Optionally report trip logs to RideAmigos	Source of trip log info	Pilot Program Benefits - use CW database to determine specific monetary benefits and earning/ eligibility requirements	Generate reports for HR/Payroll containing employee name and dollar amounts (per month)	Manually read/process reports and distribute applicable benefits to employees	Manually read/process reports and distribute money to employees	Employees receive money
Take qualifying trips		(Gift cards from Challenges - use RA info)			Send approval to HR for monetary benefits to be distributed by HR	Manage employee benefit enrollment	
Log trips in RA via Commute Tracker app or manually via RA website or via CW							
Submit receipts or other documentation if required							

Process						
1. Filter benefits to determine which benefits are calculated (below)						
2. Set up Pilot Lookup table to define participating pilot employees and categorize employees (if needed)						
3. Copy in RA trip logs for desired date range and use lookup table						
4. Set pivot table and filtering mechanisms						
5. Populate/format report						
				Key:	first priority	
					secondary priority	
					not addressed by this tool	
Benefits Filtering (example used: Menlo Park						
Process: Columns are used from left to right to identify which monetary benefits are to be calculated; see key on right						
All Benefits	**Benefit eligibility (requirements and exclusions)**	**Monetary benefit? (if no, we don't process)**	**HR process already in place? (if yes, we don't process)**	**Benefit to be distributed by Pilot Site Manager**	**Benefit to be distributed by HR**	**Reporting frequency**
Micromobility (bike, scooter)/ Walking (Primary Mode)	Up to $30/month: $1.50 a day for riding 10 days and under	Yes	No	No	Yes	Monthly
Micromobility/ Walking (Primary Mode)	or $75 Gift Card: riding 11 + days/ month	Yes	No	Yes	No	Monthly
Micromobility/Walking (Caltrain)	Up to $30/month: $1.50 a day for riding 10 days and under	Yes	No	No	Yes	Monthly
Micromobility/Walking (Caltrain)	or $75 Gift Card: riding 11 + days/ month	Yes	No	Yes	No	Monthly
Carpool/Vanpool	Up to $30/month: $1.50 a day for riding 10 days and under	Yes	No	No	Yes	Monthly
Carpool/Vanpool	or $75 Gift Card: riding 11 + days/ month	Yes	No	Yes	No	Monthly
Caltrain Parking	Submit proof of purchase of parking permit to receive $40 Gift Card	Yes	No	Yes	No	Monthly
Commuter Check	$75 per month	Yes	Yes	No	Yes	
Caltrain Go-Pass	Free, Permanent employees		Yes	No	Yes	
E-bikes/E-Scooters	2-weeks loan program		Yes	Yes	No	

APPENDIX

2

Commute Benefits Budget

Commute Pilot Budget Planning Tool

Organization Name

Date

This workbook is set up as a budget planning tool. The tables in blue indicate high-level costs.
Match the monthly cost in any of the calculators to the Budget per Month in Table 2.
To keep a copy of a specific budget scenario, copy the calculator to another part of the sheet or start a new sheet.

Table 1

High-Level Costs and Fund Allocation				Fund Allocation	
Cost Categories	**Assumptions**		**Cost**	**FTA**	**Mountain View**
Survey Incentive - Before Survey	3 x $25		$ 75.00		$ 75.00
Survey Incentive - After Survey	3 x $25		$ 75.00		$ 75.00
Monthly Prizes	$100 x 5 months		$ 500.00		$ 500.00
Final Prizes		$500	$ 500.00		$ 500.00
Ebike/Escooter purchase, repair	5 x $900 + $200 service costs		$ 4,700.00	$ 4,700.00	
Ebike/Escooter helmets	5 x $60		$ 300.00	$ 300.00	
Emergency Ride Home	$50 per ride, 2/month		$ 600.00		$ 600.00
Contingency	flat amount		$ 500.00		$ 500.00
Commute Benefits					$ 12,750.00
Total				**$ 5,000.00**	**$ 15,000.00**

Table 2

Commute Benefits Budget				
		4 months (Sep-Dec)	**5 months (Sep-Jan)**	**6 months (Sep-Feb)**
Overall Budget	$ 12,750.00			
Budget per Month		$ 3,187.50	$ 2,550.00	$ 2,125.00

Calculator 1 - Cashout

Use this calculator to enter assumptions on a daily basis (Description, Daily Cost, Days per Week, # of Participants) to calculate monthly cost.

Commute Benefits Cashout Calculator	Adjust ↓	Adjust ↓	Adjust ↓	Adjust ↓	
Benefit Type	**Description**	**Daily Cost**	**Days per Week**	**Participants**	**Monthly Cost (4 weeks)**
Parking Cashout	$5/day ($2.50 per trip)	$ 5.00	1	10	$ 200.00
Parking Cashout	$5/day ($2.50 per trip)	$ 5.00	2		$ -
Parking Cashout	$5/day ($2.50 per trip)	$ 5.00	3	12	$ 720.00
Parking Cashout	$5/day ($2.50 per trip)	$ 5.00	4		$ -
Parking Cashout	$5/day ($2.50 per trip)	$ 5.00	5	12	$ 1,200.00
Total Cost per Month					**$ 2,120.00**

<- match this to the desired Budget per Month in Table 2.

Calculator 2 - Daily

Use this calculator to enter assumptions on a daily basis (Description, Daily Cost, Days per Week, # of Participants) to calculate monthly cost.

Commute Benefits Daily Calculator	Adjust ↓	Adjust ↓	Adjust ↓	Adjust ↓	
Benefit Type	**Description**	**Daily Cost**	**Days per Week**	**Participants**	**Monthly Cost**
Bike Benefit	reimburse up to $5/day	$ 5.00	5	5	$ 500.00
Bike Benefit					$ -
Walk Benefit	reimburse up to $5/day	$ 5.00	5	5	$ 500.00
Walk Benefit					$ -
Transit Benefit	reimburse up to $5/day	$ 5.00	5	5	$ 500.00
Transit Benefit					$ -
Transit Parking Benefit	reimburse up to $2/day	$ 2.00	5	5	$ 200.00
Transit Parking Benefit					$ -
Carpool Benefit	subsidy of $5/day	$ 5.00	5	5	$ 500.00
Carpool Benefit					$ -
Total Cost per Month					**$ 2,200.00**

<- match this to the desired Budget per Month in Table 2.

Calculator 3 - Monthly

Use this calculator to enter assumptions on a monthly basis (Description, monthly cost, # of participants) to calculate monthly cost.

Commute Benefits Monthly Calculator	Adjust ↓	Adjust ↓	Adjust ↓	
Benefit Type	**Description**	**Monthly Cost**	**Participants**	**Monthly Cost**
Bike Benefit	Incentive: $100/month	$ 100.00	5	$ 500.00
Bike Benefit				$ -
Walk Benefit	Incentive: $100/month	$ 100.00	5	$ 500.00
Walk Benefit				$ -
Transit Benefit	Incentive: $100/month	$ 100.00	5	$ 500.00
Transit Benefit				$ -
Transit Parking Benefit	Incentive: $40/month	$ 40.00	5	$ 200.00
Transit Parking Benefit				$ -
Carpool Benefit	Incentive: $100/month	$ 100.00	5	$ 500.00
Carpool Benefit				$ -
Total Cost per Month				**$ 2,200.00**

<- match this to the desired Budget per Month in Table 2.

APPENDIX

3

Commute Concierge Services Memo

Mobility on Demand Fair Value Commuting (FVC) Demonstration
Organization Name: Commute Concierge Services

Your commute has a significant impact on your day, including cost, time management, and even personal health. If you are looking to try a more sustainable & efficient alternative commute instead of a drive-alone commute, take advantage of great commuter benefits through the new commute pilot program.

If you want to try a new commute but don't know where to start, check out our Commute Concierge service offered through the new Pilot Program. Your Commute Concierge provides eligible employees with personalized commute recommendations based on your work schedule, before and after work commitments, and any other factors that are important to you.

There are a number of services we can provide to you, including:

Commute Trip Planning:
- Discuss your expectations, motivations, and goals for the Pilot Program.
- Discuss your commute preferences and current challenges.
- Map alternative options via transit, rideshare, carpool, vanpool, biking, or walking.
- Find the best routes for you using RideAmigos and other apps.
- Walk through how to log your commute trips on the RideAmigos platform.
- Review possible challenges you can participate in to win prizes.
- Give personalized commute advice.

During the commute concierge process, we:
- Set up initial in-person meetings.
- Provide you with helpful tools and resources.
- Support you via email and/or phone to respond to your questions & comments.

If you are interested in learning more or getting started with Commute Trip Planning, please contact your Commute Concierge:

Contact info here

For further details on **Commuter Benefits Guidance**, including:
- Reviewing existing eligible commuter benefits.
- Finding which Pilot Program commuter benefits work for you.

APPENDIX

4

Commute Time Policy Advice Memo

Mobility on Demand
Fair Value Commuting (FVC) Demonstration
Pilot Partner Program
Commute Time Policy Advice
September 11, 2019

The purpose of this memo is to document policies and suggestions about allowing commuters who use alternate commute modes to count their time as working time. The team initiated a posting to the national Transp-TDM listserv specifically about this question.

This advice represents a snapshot in time of current practice collected from members of the listserv, who are generally TDM professionals across the U.S. Therefore it is possible that individual advisory statements may conflict. That is acceptable and we recommend using the FVC Pilot Program to investigate what works best for each employer.

Question

"Do employers allow commuting time to be counted toward work hours? I'm thinking particularly on public transit, private employer shuttles, carpools, vanpools, maybe even walking to work, where one could reasonably work in certain ways by reading, responding to e-mails, participating in conference calls? (I'm not suggesting this would apply to modes where employees have to drive their own vehicle, like a car or bicycle.)

Is there guidance that expressly prohibits or encourages this?
And if there is guidance, are there limits on the percentage of the total commute time that's allowed (50?, 75%, 100%?), or is it more based on the honor system?"

Responses – Practical Advice

1. Genentech definitely allows commuting time to be work time. I don't believe we have any formal policy around it. And we make sure our vehicles are setup for maximum productivity with plenty of room, electrical outlets and great WiFi.
2. I am employed by the Oregon Dept. of Transportation. Some of our managers may approve use of vanpool or transit time (when you are not the driver and can do some work) as work hours, but only if you are actually working reviewing documents, responding to emails, etc. I have not heard of walk time being approved.
3. Your employees must be responsible, and act as professionals. If you're working, then you're working. Typical commute to/from home are not claimable, but there are a ton of circumstances that would be.
4. Anecdotally, I think this is commonly handled one-off, but would be worthwhile to investigate / formalize. I account for travel on the bus in my work hours, after discussion with a supervisor. Actually, typing this email on my trip into work this morning - ha! Please let the listserv know the results of any efforts you take on!
5. We agree with your line of thinking and would appreciate seeing any formal employer policies that have been developed. Transit commuters accomplish a lot of work during

their travels—I see it with my own eyes every day; they're responding to emails, writing legal briefs, and taking calls while walking to transit stations. There's even a man on my bus who writes well-reviewed young adult novels on his laptop.

6. I feel like the market around this is changing. But from what I understand from our HR department (through the process of hiring temp staff to do field work), the federal government technically prohibits the payment of people for their commute time to and from a job site (if nothing else is being done during that time, like calls, emails, etc). I think it is permissible by tech companies only because staff are given the infrastructure to actually do work while in commute.
7. Many employers have concern for employee wellness, as they should. They provide health insurance beyond minimums, provide gym memberships, daycare, parental leave and more. Transit use fosters wellness, as exercise or just the opposite of what happens when you drive. So your focus on the use of commuting time for work is perhaps too narrow. The topic could be framed broader as 'doing what the employer wants (and pays to have) done' to further underscore the value of transit use to employers. I recall that there is research to support the health benefits of transit use, as well as common sense, e.g., employees using transit in one city had lower BMIs.
8. As you probably know most consulting EAC (Engineering, Architecture, Construction) firms permit working from any and everywhere as long as the time is billable. No limits at the firms I worked at that did allow it. Municipalities have a different work environment which makes such efforts and tracking employees/performance more challenging. I'm not sure what they're looking for besides accountability that work was really occurring. How that's done? Perhaps a journal. On the other hand, it's generally not considered safe practice to encourage reading/texting while walking especially if one needs to cross any streets so I would not think that a safe part of policy. Those tasks that can be done via the other modes seem more reasonable to me.

Responses – Legal Considerations

1. Labor law is tricky. Employees who are paid hourly (non-exempt) are required to track and log their hours worked. Employees who are paid a salary (exempt) are paid to get their job done regardless of the number of hours they work. When employers start giving exempt employees "credit" for the time they commute then it gets into the grey area of whether or not the employee is truly "exempt". Losing the exempt status has some major implications.
   https://www.monster.com/career-advice/article/whats-the-difference-between-exempt
2. In my experience, there's nothing prohibiting an employer from paying an employee for the commute. Quite the opposite, the law and case law typically argues that employers shouldn't have to pay for the commute.
   - The best guidance I've found on the matter has been in Workers Comp law (California Labor Code 3600.8).
     - (a) No employee who voluntarily participates in an alternative commute program that is sponsored or mandated by a governmental entity shall be considered to be acting within the course of his or her employment while utilizing that program to travel to or from his or her place of employment, ***unless he or she is paid a regular wage or salary in compensation for those periods of travel*** [emphasis added by ProspectSV]. An employee who is injured while acting outside the course of his or her employment, or his or her dependents in the event of the employee's death, shall not be

barred from bringing an action at law for damages against his or her employer as a result of this section.

- Of course, this is written from the perspective of defending against an employee's potential demand to be considered as "working" during a commute, not facilitating a willing employer's payment for commute time.
- I've never seen anything to prevent an employer from choosing to pay employees during their commute time. From a business/liability perspective, I can see it working so long as the employee is either required to take employer transportation (see the law above) or the employee is required to work during the commute. One potential scenario could be that an employer has chartered a Wi-Fi-enabled bus for a cluster of employees living 1 hour's drive from the office. The employer can make agreements with the bus riders such that so long as they're connected to the bus Wi-Fi (or on business calls) and working, they will get paid for their commute time. Call it a mobile remote office. Specific policy and expectations would need to be set, but I don't see why it couldn't be done.

3. I would check with a Risk Management Specialist. If employees commute is considered "work time" and they are injured during their commute the employer will be liable for worker's comp at the very least.
4. If you haven't yet, I'd strongly suggest checking the CA laws around workmen's compensation as you explore this concept. The reason for that is that many of those laws actually exclude the commute from the definition of work, under the assumption that they are not performing work while doing the commute. With an increased number of folks working while on transit, if there is an accident, that could get real difficult very quickly for the lawyers that would be involved. If you do develop such a policy, I would make sure that the attorneys include some language around the definition of on-the-job while in the commute and how that would be determined.

Responses – Similar topic/question

1. This is a great question, and I would certainly appreciate if you could share any feedback you receive. We're working with a large employer who is considering implementing a similar program, but at this point we don't have a model or best practices to lean on. We love to understand how other organizations are approaching this.
2. This sounds like a valuable research project, that if it has not been done should be done. Please could you let me know what you get back.
3. Interesting question - I don't know of any formal policies but would love to see any that you are able to collect!
4. Would you mind sharing any info you receive on this topic with me? I have the same question as I propose these options to employers and want to make sure I provide as much info as possible. Any help appreciated!
5. I would love to hear what you find out.
6. That's an interesting question. I would love to hear more about the responses you receive.

APPENDIX

5

Commuter Wallet White Paper

Commuter Wallet

Discovering Benefits from your Employer, Planning Multimodal Trips, and Getting to Work without the Car

White Paper by Interline Technologies LLC
for the City of Palo Alto
in support of Fair Value Commuting

Submitted March 16, 2020

Interline

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Executive Summary

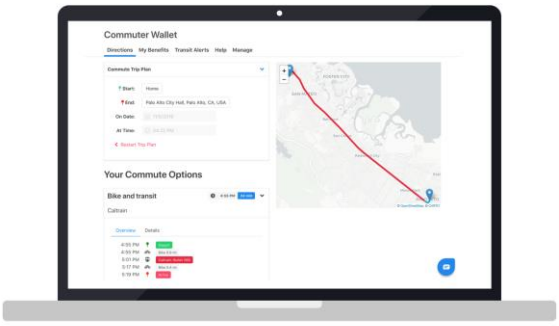
The Commuter Wallet is a software solution created to shift employees from driving alone to using their benefits for transit and other modes of travel.

The Commuter Wallet enables employees to plan intermodal commutes (that is, commutes that combine more than one mode), to view benefits relevant to their commute plan, and to log their trips taken and benefits used. This process, available on employees' smartphones and computers, replaces the need for HR forms, intranet pages, and other dispersed information sources about an employer's commute benefits.

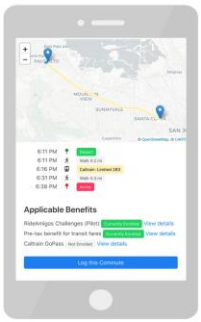
Interline and Lab Zero built the Commuter Wallet through a multi-step process of design, development, and deployment. This iterative approach allowed us to learn from all project stakeholders (staff commuters, transportation demand managers, and project managers) and to adapt to unexpected findings.

This white paper steps through the design, development, and deployment of the Commuter Wallet.

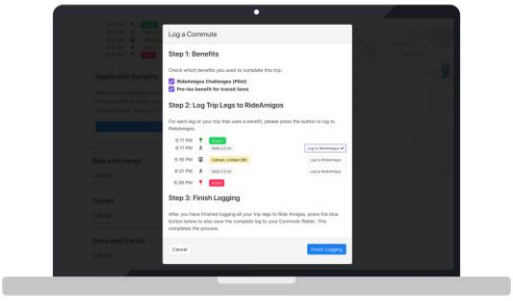
Plan an Intermodal Commute



View Relevant Employer Benefits



Log Trips Taken and Benefits Used



Overall Project Context

The Commuter Wallet is a software solution designed and developed by Interline Technologies and its partners. The Commuter Wallet has been created as part of the Fair Value Commuting (FVC) project, which in turn has been funded by the Federal Transit Administration's Mobility on Demand Sandbox grant program (also known as the FTA MOD Sandbox). The overall FVC project is well summarized by the urban think-tank SPUR, in their *Driving Change* white paper[1]:

> "The Fair Value Commuting (FVC) project [aims] to test and help scale a package of strategies to reduce drive-alone commute trips. While commutes are not the only type of trip people take, they do represent up to a third of all trips taken in the [San Francisco] Bay Area, and because they mostly cluster around certain hours, they cause more congestion than other trips and often lead to greater safety threats and increased emissions from idling cars. So while commutes do not constitute the majority of trips, encouraging commuters out of cars can go a long way to mitigating the collective and harmful impacts of driving."

The FVC project includes five elements:

1. Enterprise Commute Trip Reduction (ECTR) software platform
2. Commuter Wallet mobility aggregator
3. Parking "cashout" or "feebate" system
4. Gap Filling analysis to study where commuters' needs are unmet
5. Review of systematic barriers and related policies

This white paper focuses on the second element in the above list. In its design, its development, its use by commuters, and its use by transportation demand managers, the Commuter Wallet has touched on many aspects of the overall FVC project. Therefore, this white paper also addresses connections between the Commuter Wallet and the other four elements of the FVC.

In this white paper, we'll first cover the *design sprint* process used by our team to orient and define the Commuter Wallet within this broad overall project context. Next we'll consider the *development process*, which leveraged both reusable open-source software components and open data. We'll review the *deployment* and *user support* processes, which put the Commuter Wallet into the hands of commuters and transportation demand managers. And finally, we'll summarize feedback and next steps for the Commuter Wallet.

[1] *Driving Change: Policies to expand on employer-based Mobility on Demand pilot programs and reduce drive-alone commuting in the Bay Area* (December 2019) by Sarah Jo Szambelan, published by SPUR, San Francisco.

Design Sprint

Interline and partner firm Lab Zero often use a set of practices called *user-centered design* when beginning new, complex software projects. The overall project may have specific requirements that must shape the solution: requirements concerning functionality, integrations, technology, deployment timeline, and so on. These requirements are often codified in procurement contracts, especially in the public sector. However, following our user-centered design practices, we momentarily pause on specific requirements and ask broad questions. This discovery process is focused on the project's users: the people who will directly make use of the software solution, the people who will indirectly benefit from it, the people responsible for managing the software solution, etc. We constrain the design discovery process to a single week called a *Design Sprint*.[2]

Our team set the following broad questions for the Design Sprint:

- Who is our intended audience?
- What user segments do we need to consider?
- How does the user perceive their pains and needs, related to their commute benefits?

To consider these questions, we set up a structured interview process. We discussed potential stakeholders with the FVC project's leaders and turned these details into *user personas*. (More on this concept below.) For the most important of the user personas, a staff member of one the pilot cities who has commuter benefits, we prepared a script to use when interviewing some of them. We met in person with staff commuters and the other two groups of stakeholder/user personas, took notes, and synthesized these notes into key insights. Our team shared and discussed the key insights with the FVC project's leaders. And, finally, the designers on our team used the insights to create *design artifacts*, to inform the development process and subsequent steps of the Commuter Wallet's creation and deployment to end users.

This overall process is multi-step. In the earlier stages, there is no specific "solution" — we are not asking stakeholders to test software or even consider hypothetical software. It is only in later stages, after we have raw input and distilled insights from interviews, that we consider the form a specific software solution can take.

Identifying Stakeholders and User Personas

After reviewing FVC project materials and discussing with the project's leadership, our team defined the following three user personas for the Commuter Wallet. Each user persona characterizes a type of person we want to support using the Commuter Wallet. The boundaries and descriptions are approximate; but they are distinct enough so that we can refer to the user personas repeatedly throughout the creation and roll-out of the Commuter Wallet.

[2] The week-long design sprint has been especially promoted by Google's venture capital arm. See the book titled *Sprint* and the website at https://www.gv.com/sprint/ for more information.

Project Managers:

- Leading the Fair Value Commuting (FVC) grant
- Overseeing the creation of the Commuter Wallet
- Coordinating among the overall project components and partner organizations

Pilot Partner / TDM Managers:

- Coordinating transportation demand management (TDM) for each participating city
- Managing the commute benefits offered to eligible staff commuter members
- Implementing the Fair Value Commuting (FVC) grant and pilot and integrating commute benefits with the RideAmigos platform[3]
- Promoting the FVC pilot, helping staff commuters get onboarded, and ensure new benefits via the pilot are distributed through the RideAmigos platform

Staff Commuters:

- Working for one of the participating cities and are eligible for receiving commute benefits
- Some are participating in the Fair Value Commuting (FVC) pilot; Additional benefits from pilot are awarded to those who log their daily commute to and from work using the RideAmigos platform, via both app or website
- Some are transportation planners and engineers who also have a professional interest and responsibility for improving commute options
- All regularly commute from home to work; users live in a wide range of locations, including Marin, San Francisco, the Peninsula, San Jose, Gilroy, Half Moon Bay, the East Bay, and as far as the Central Valley
- The commute benefits and transport options available to each Staff Commuter vary widely, depending upon where exactly they live.

Interview Script

Staff from Interline and Lab Zero interviewed people representing all three user personas, including staff of the cities of Palo Alto, Mountain View, and Menlo Park.[4] We met in-person, at each city, to minimize the effort required by participants and to encourage free flowing conversation. Based on our overall discovery questions and reviewing FVC project materials, we prepared the following interview script:

[3] RideAmigos is the brand name of the Enterprise Commute Trip Reduction (ECTR) platform used as element #1 of the FVC project.

[4] Cupertino joined the FVC project at a later date, after the Commuter Wallet Design Sprint was complete.

“

1) Do you use existing commute incentives/benefits from your city employer? If yes:
    - For how long? How did you hear about it? How do you access them?
    - What works well / not well present day?
    - Example: Do you carpool? Have you ever carpooled? What would make carpooling possible?
2) What’s the hardest part about your accessing/using your commute incentives?
    - Can you tell me about the last time that happened? Why was that hard?
    - What, if anything, have you done to solve that problem? What don’t you love about the solutions you’ve tried?
3) In an ideal world, how often should your employer communicate commute incentive options?
    - How do you want to consume this info? How often do you perceive it today?
    - Do you want communication to be more or less often?
4) How can we help your coworkers or your boss get to work and use these incentives too?
5) Why were you interested in this meeting? What else would you like to share?
6) In the context of your commute incentives and this Commuter Wallet project, if you could wave a magic wand, what would you do/create/fix/have etc.? How can we help you access and use your existing commute incentives?
7) What else comes to mind that we haven’t talked about? Do you have any questions for us?

”

Interviews with Project Managers and Transportation Demand Managers included additional questions and discussion, concerning their involvement in the management of commute benefits and the roll-out of the FVC project at each site.

Interviews with Staff Commuters were with one or two participants at a time. If two participated, we ensured that they were peers (rather than a supervisor and a subordinate). We confirmed with Project Managers and all participants that comments would only be shared anonymously—that is, participants could speak freely without worrying that their specific concerns might be associated with their name.

Insights from Interviews

After all our interviews, our cross-disciplinary team assembled and reviewed notes. We identified common themes and distilled each into insights that could inform later stages of the design process. Following a user-centered design practice used by many technologists, we phrase some of these insights as *how might we?* questions. This wording reminds everyone that our ultimate goal is to create a solution for users, while not overdetermining the specific goals. We also label some of our insights as *hypotheses*. Again, to come up with labels but keep them tentative.

Insights from Interviews with Project Managers

Human Resources Concierge Hypothesis

- There is a lot of opportunity for HR to have more materials and support in place to help employees access and learn about their commute benefits and transit options.
- Getting to and from work was cited as a critical issue facing employees in the Bay Area and Northern California.
- How might we design the Commuter Wallet solution to best support human resources and a concierge role?

TDM Ownership Hypothesis

- Having a person on the team to own the TDM and HR concierge support will help the city promote and drive commute benefits.
- How might we design more than an app and think about the communication, FAQ, and HR-support aspect of the project?

Insights from Interviews with Transportation Demand Managers

RideAmigos is helpful for challenges and promoting the pilot program.

- How might we help the Cities of Palo Alto, Menlo Park, and Mountain View successfully roll out the Commute Wallet solution and best integrate the RideAmigos platform?

Additional resources are needed to promote commute benefits and transit options.

- How might we ensure Pilot Transportation Demand Managers (TDMs) are set up for success and have the best resources and communication strategies to rollout the Commuter Wallet solution?

A software-based carpool solution is top-of-mind but not being adopted by users.[5]

- How might we take the lessons learned from the carpool app rollout and apply them to the Commuter Wallet rollout to help make an impact for city employees' commute benefits and transport options?

Insights from Interviews with Staff Commuters

The commute pain is real.

- How might we promote existing commute benefits and transport options to city employees to help them take advantage of existing benefits, given the existing pains of limited transit options, gridlocked traffic, and lack of awareness of existing commute options?

[5] A carpool app was procured and provided to the FVC pilot cities as part of element #1 "voluntary pilot programs at employer sites."

> I would not be able to afford to work here, if not for my commute benefits.

New employee onboarding is the single biggest opportunity to promote commute benefits.

- How might we take advantage of new employee onboarding and open enrollment time periods to promote commute benefits and transport options?

> [The city TDM manager] helped me get set up. If not for him, I would have missed these benefits altogether.

End users report a big communication gap from HR.

- How might we make communication more consistent and accessible to all employees, beyond those who are already interested in alternatives to driving to work? How might we design and promote a source of truth for commute benefits and transport options?

> I wish HR communicated updates and reminder to me every 3 months

Free parking, after-hour schedules, kid-pickup, and lack of a guaranteed ride home are the biggest fears.

- How might we focus on helping users get to and from work, when “to and from” includes 1) users who live in the East Bay and Central Valley and 2) users who need to work late in the evenings when guaranteed ride home programs do not work and transit is limited or unavailable altogether?

North-South vs. East-West.

- There are very few resources for employees who live outside of the Caltrain North-South corridor.
- How might we better assist the large number of employees who live in the East Bay and Central Valley?

Healthcare benefits are a good role model.

- How might we use healthcare benefits and enrollment as a model to help city employees discover their benefits and take advantage of commute benefits and transport options?
- How might we use Healthcare.gov or CoveredCA.org as a good mental model for the Commuter Wallet?

> “
>
> HR helps with my healthcare, but why not with my commute?
>
> ”

Users are overwhelmed by too many underwhelming transit apps.

- How might we build the Commuter Wallet to optimize benefit exploration so that employees understand what benefits they have and how to connect them to their daily commute?

> “
>
> I need one all-in-one solution to help me sort through my options.
>
> ”

The RideAmigos pilot is limited to “one mode” of transit per trip.

- How might we optimize commute benefits and transport options for users who rely on multi-modal commutes to get to work, in particular public transit riders?

Design Principles

After further discussion, our team distilled these insights into three design principles for the Commuter Wallet:

Access	**On the Go**	**Discovery**
Users are unaware of benefits, overwhelmed by a plethora of transit and map apps, and/or are missing out from benefits they are entitled to use altogether.	City employees work late and live all over Northern California, despite current commute benefits focusing primarily on the Caltrain north-south corridor.	People assume they only have one option when traveling to and from work, but in reality there are many commute benefits and transit options.
We intend the Commuter Wallet to help users access commute benefits and transit options.	*We intend the Commuter Wallet to help users get to home and work, no matter the time or location.*	*We intend the Commuter Wallet to help people try new commute benefits to improve their commute.*

Design Artifacts

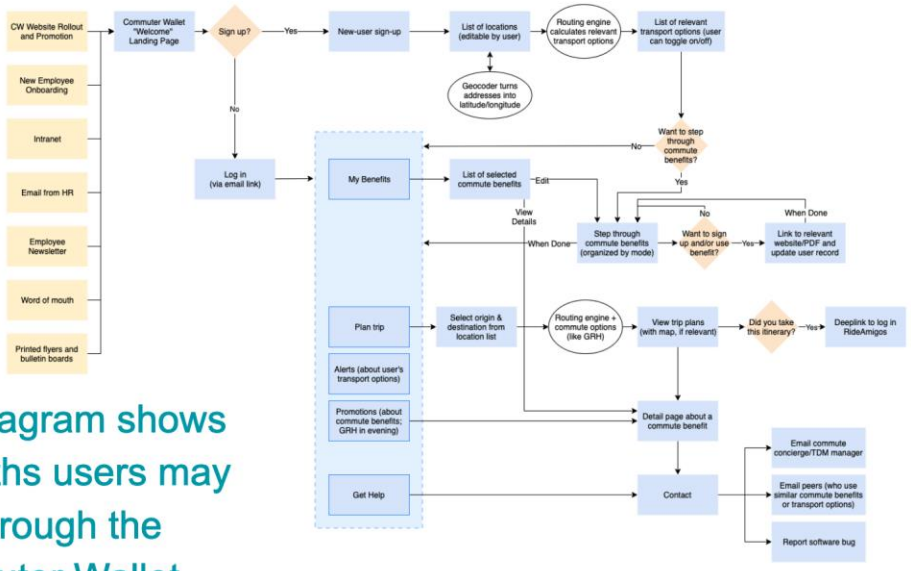
After defining the user personas, holding interviews, reviewing notes, and distilling insights and design principles our team was ready to prepare *design artifacts*. For this project, we used two specific types of visual design artifacts:

- *journey maps*, which show the *flows* a user can take through a software system. Steps on each flow may be individual user-interface (UI) screens, or they may be abstract steps that show decision-points.
- *wireframes*, which are rough sketches of the contents of a given UI screen. Text is often approximate (“lorem ipsum”) and UI *widgets*, such as buttons, are often just signified with boxes.

Journey maps are high-level overviews of the choices users can take as they navigate through a software system. Wireframes are fine-grained views into the information available to them at each point and the specific ways they can interact with the UI.

Note that at this point in the Design Sprint, our team reengaged with many of the specifics of the FVC project and the Commuter Wallet’s functional requirements. We could now use our distilled insights and design principles together with the functional and technical requirements assigned to Interline for this project.

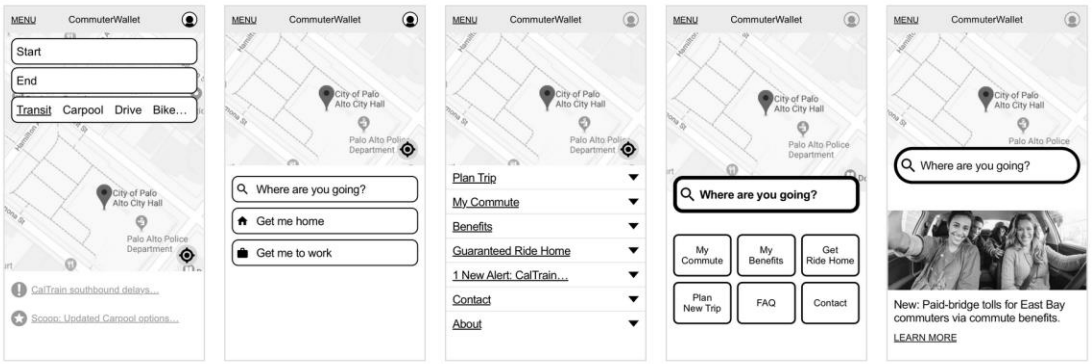
Journey Map/User Flows



This diagram shows the paths users may take through the Commuter Wallet.

Landing Page: 5 Different Concepts

Rapid mobile-first, low-fidelity wireframes that demonstrate options.



Wireframes are simple drawings of software user interfaces.

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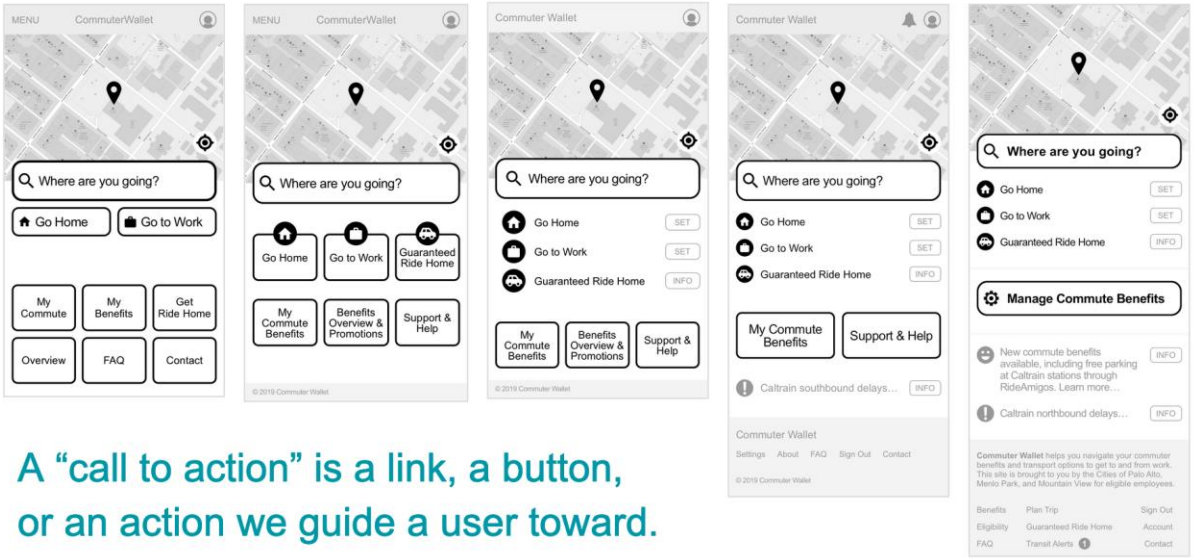
Landing Page: Concept Iterations

Explorations on hierarchy and “calls to action.”



A “call to action” is a link, a button, or an action we guide a user toward.

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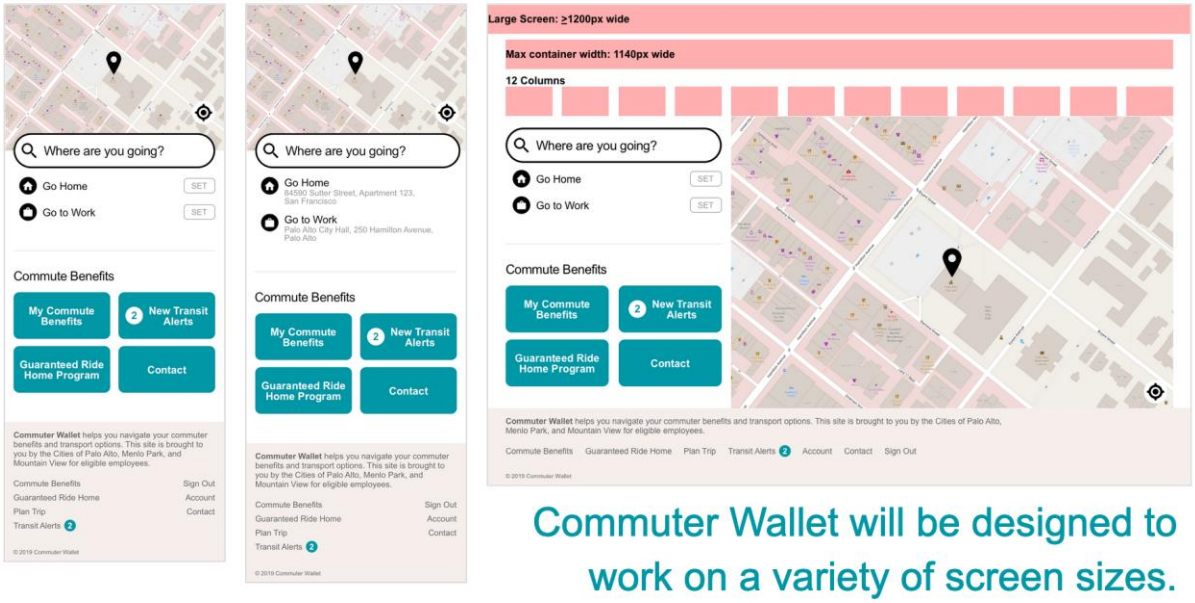
Landing Page: Refinements

Explorations for visual design polish and responsive design (*mobile vs. desktop*).



Commuter Wallet will be designed to work on a variety of screen sizes.

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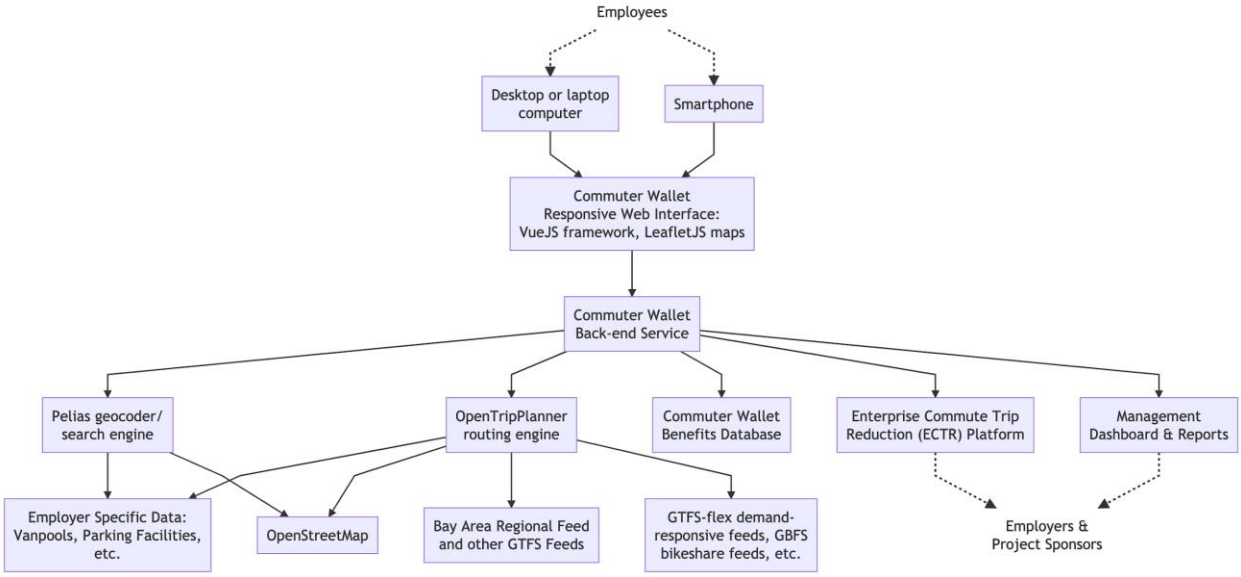
Development Process

Each application we build at Interline and Lab Zero is custom. We do not do “white label” software. Instead, we reuse open-source components from one project to the next. Some of these we created ourselves. Others come from other organizations, such as the LeafletJS mapping library and the VueJS framework.

We believe this combination of reusable components, assembled with a custom front-end is the ideal combination for rapid *and* innovative apps. We know our tools well and have full control over them, so we can hew as closely as possible to the findings of our Design Sprint. However, we do not start each project from scratch. Each project builds on the last and contributes to the next.

Software Architecture

In parallel with the Design Sprint, our team prepared potential software architectures. Below is the eventual architecture of the Commuter Wallet:



Routing Engine

A key open-source component that we rely on is the OpenTripPlanner (OTP) routing engine, which has been used in many FTA MOD Sandbox projects.[6] OTP has been expanded over the years to support both *multimodal* and *intermodal* trip planning, and provides an excellent, extensible platform for generating travel plans.

[6] For more information about the OpenTripPlanner routing engine, see http://www.opentripplanner.org/

OTP is designed to work primarily with open data sources: map data from OpenStreetMap (OSM) and public transit schedules published in the General Transit Feed Specification (GTFS) format. This combination of open-source software and open data has proven to be a powerful tool, and creates a virtuous cycle where improvements to one project makes all other projects in the ecosystem more useful.

OSM[7] is a global mapping project similar in concept and scope to Wikipedia; millions of users have contributed their own knowledge to create a highly accurate representation of the world, and critically, a model complete with metadata about each individual road that is sufficient for efficiently calculating travel itineraries that are competitive with commercial data sources using proprietary algorithms. The complete OSM "planet" contains billions of points and is well over 50Gb in size; to keep the computational resources manageable, Interline created a custom "extract" for the Northern California region that is updated daily.[8]

GTFS is an open specification for publishing transit information. GTFS was originally developed by Portland TriMet and Google and is now under the stewardship of the MobilityData industry consortium. The transit schedules for this project were sourced from the newly created MTC Regional Feed, a single GTFS file which contains integrated schedules for 33 Bay Area transit agencies.[9] This was supplemented with a few additional schedules for local services that are not part of the MTC open data umbrella such as the Stanford Marguerite, Palo Alto, and Mountain View shuttle services.

For this project, we were able to customize a number of OTP parameters to tailor results to the specific mixture of walking, bicycle, transit, and driving itineraries required for presenting all relevant benefits to users. The original plan also included OTP customizations to consume real-time availability information from Transportation Network Companies (TNCs) such as Uber and Lyft; however, while these companies had agreed to provide API access to earlier FTA MOD Sandbox projects, the competitive landscape has shifted and they were less open to providing access for this project.

Benefits Information

We worked with each city to compile a list of all transportation benefits and to identify the features required for the benefits data model. The Commuter Wallet's benefits data model is typical of most *relational data models*, but with a few unique features. Benefits include a name and description, an estimate of the monetary value of the benefit (as pre-tax and/or post-tax dollars), the eligibility criteria to enroll in the benefit, instructions for enrolling and for using the

[7] For more information about OpenStreetMap, see https://www.openstreetmap.org/
[8] Interline OSM Extracts are updated daily and available free of charge at https://www.interline.io/osm/extracts/
[9] MTC is the Metropolitan Transportation Commission, a public agency responsible for coordinating transportation funding and planning across the nine counties of the San Francisco Bay Area. Interline created the Regional Feed under contract to the MTC. For more information, see https://www.interline.io/blog/mtc-regional-gtfs-feed-release/

benefit, any reporting requirements necessary for documenting usage of the benefit, and if logging the trip with RideAmigos is required. The more complex aspect is how each benefit is associated with one or more *transport modes*; this is described in more detail below. Each user may enroll or disenroll in benefits provided by their employer. The HR admins for each employer can view the current roster for each benefit.

Benefit name	**Benefit summary**
Caltrain GoPass	Unlimited all zone pass
Carpool Benefit	Up to $30/month post-tax benefit for carpool users
Walk Benefit	$20/month post-tax benefit for commuters who only walk to work
Pre-tax benefit for transit fares	25% subsidy on max $265/mo pre-tax + $235 post-tax transit fares
Reimbursement for Parking at Transit	100% reimbursement on max $82.50 per month: direct pay (receipts required)

Selected benefits offered by Palo Alto.

Interline and Lab Zero were supported in this effort by Prospect Silicon Valley, whose staff prepared an initial inventory of benefits at all pilot cities. The process of inventorying benefits and distilling each into a consistent data record served as a useful exercise: Some benefits were not fully defined and required further conversation with city staff. After multiple rounds of review, the Commuter Wallet's data model matured into a concise and flexible way to represent benefits that were previously described ambiguously on HR intranets or forms.

Enriching Trip Plans with Benefits Information

A crucial goal was integrating transportation benefits with the itineraries produced by OpenTripPlanner. As described above, benefits can be associated with any relevant transportation modes. This is a flexible association, based on a set of simple rules that match a benefit to an itinerary. For instance, consider two modes, a "generic public transportation" mode, and a more specific "Caltrain" mode.[10] The generic mode matches any itinerary with a transit leg, while the Caltrain mode only matches itineraries that include a ride on Caltrain. In this way, a benefit can target all types of public transit by associating with the generic transit mode (e.g. Federal pre-tax), while a benefit that requires a specific transit operator will only match the eligible subset of itineraries (e.g. Caltrain GoPass). A benefit can also be associated with

[10] Caltrain is a commuter railroad that serves the San Francisco Peninsula. It's an especially important commute option for Palo Alto, Mountain View, and Menlo Park, as it serves stops close to those cities' downtown business districts and their city halls.

multiple modes, such as subsidized parking at Caltrain benefit which only matches itineraries that contain both driving and Caltrain legs.

The trip planning process then takes all available benefits and all their associated modes into account and attempts to generate itineraries for each possible combination, e.g. separate OTP requests for driving trips, for walking, for bicycle, for transit, and for specific transit operators such as Caltrain. This scattershot approach has some computational costs, but ensures a large pool of possible itineraries that can then be winnowed down.

One major challenge during both the development and deployment of the Commuter Wallet was striking the right balance between showing users the fastest, most efficient itineraries against the need to highlight trips eligible for benefits. Showing only the fastest itineraries might leave users unaware of valuable benefits, while showing every possible trip on every possible mode overwhelms users with too many choices. For instance, a user commuting from Half Moon Bay to Palo Alto may be eligible for a bike subsidy but is probably uninterested in a 2 hour bicycle ride through the hills. Itinerary filtering and ranking is accomplished in a few different ways. First, unrealistic or cumbersome itineraries, determined by basic time & distance cut-off values, are hidden. Second, any duplicate itineraries are removed. Third, itineraries are weighted by mode, allowing an employer to preferentially show transit or biking trips over driving trips. The itineraries are then ranked by mode-weighted travel time and presented to the user. Each trip shows a brief summary of mode, time, distance, and the relevant benefits. These can be selected by the user to show the full details for each trip and enter the trip logging workflow, described below.

Real-time Transit Alerts

Travel time in the real world rarely matches static models or schedules, and incorporating real-time information is critical for choosing the best trip. The open, publicly accessible real-time information available for this project included real-time transit updates and service disruption alerts from MTC, as well as Twitter feeds from local agencies. The real-time transit updates are produced by MTC in GTFS-RT format and are consumed by OTP to update the schedule about once every 15 seconds. The other two sources are merged and presented to the user as notifications. Twitter feeds included SamTrans, Caltrain, BART, VTA, and Mountain View shuttles. Filters are applied to each feed to match each agency's preferred style (e.g. "#Caltrain" to distinguish service alerts from general updates about the agency). This worked reasonably well, and "stale" alerts are removed from the user's notifications after a certain period of time. However, the service alerts sourced from MTC presented a few difficulties. While the service alerts API is available for many agencies, Caltrain and SamTrans do not regularly push service alerts out through this channel. Additionally, while the GTFS-RT specification allows for system-wide service alerts, in practice each service alert is specific to individual transit routes or stops. As with itineraries, this presents an information overload problem; showing all alerts on all routes to the user is a poor experience, and it is difficult to narrow down the alerts without selecting a specific itinerary. Fortunately, the Twitter feeds proved useful in testing and provided

the right level of information to users. As such, we removed MTC GTFS-RT service alerts from the Commuter Wallet.

Logging Trips and Benefit Usage

For the overall FVC project, the combination of the Commuter Wallet and RideAmigos comes together to log the usage of specific benefits for a given itinerary. Once a user has planned their trip and selected an itinerary in the Commuter Wallet, they can then create a record of this trip and the associated, enrolled benefits that were used.

Two types of logs are kept: an internal Commuter Wallet log, and a workflow to help enter trips into the RideAmigos system. The internal log is recorded as soon as the user enters the logging workflow. The RideAmigos integration uses a special form and requires several steps. First, the user selects which leg of the itinerary that will be entered into RideAmigos. This opens a form on RideAmigos platform with pre-filled values generated by the Commuter Wallet. This process must be repeated for each leg because RideAmigos does not natively support intermodal trips.

The RideAmigos integration required a number of technical and project management discussions with all teams. A couple options were evaluated: a full integration where Commuter Wallet would directly interact with RideAmigos APIs on behalf of the user, and a simpler *deep link* integration where Commuter Wallet would send users to a form on the RideAmigos platform. The main benefit of the deep link integration is that Commuter Wallet would never need to be aware of RideAmigos API or data model; all interaction would be on the RideAmigos form, under complete control of RideAmigos engineers. This minimizes the amount of coordination required for future maintenance. The main drawback is that users must be logged in to both the Commuter Wallet and their RideAmigos account for the process to work correctly, and second, that it requires more back-and-forth between the two systems than would be required with an API level integration. Additionally, development of the special form on the RideAmigos site required more time and coordination than originally planned.

This integration between the Commuter Wallet and RideAmigos systems serves as a model for the future. Technically, it shows how the Commuter Wallet can use deep-linking to connect to other apps and services. After receiving a suggestion from users, we used deep-links to let users connect off to Google Maps, Apple Maps, and Waze when they select an auto itinerary in the Commuter Wallet. Also, in terms of process, the experience of collaborating with RideAmigos shows how we can design and implement potential future integrations, such as deep-linking into booking and payment systems.

Deployment

Just as our approach to design and development were iterative, we deployed the Commuter Wallet to pilot participants using a multi-step process that engaged all three of our user personas/stakeholders. First, we reviewed the Commuter Wallet as a full package with the

FVC's project managers—in addition to the software itself, this included preparing welcome materials and documentation, as well as support channel options. Second, we presented the package to TDM managers at each pilot city site. We offered each their choice of support channels, as well as the options to either distribute the welcome materials to staff commuters themselves or to have the Interline team do so. Third, we set up accounts for staff commuters and welcome each. We staged this process, so that each city was brought online on a different day, allowing the Interline and Lab Zero team time to identify and fix any initial problems, before the next round of users joined.

User Sign-in

A known challenge for all types of enterprise software (software for use within businesses and institutions, rather than for consumers) is integrating with each organization's existing user authentication and authorization systems. After considering both technical and design merits, we implemented an email-based *magic link* approach to user authorization in the Commuter Wallet. This process consists of the following steps:

1. City staff provide a list of all users (including name and work email address).
2. Interline and Lab Zero staff provision user accounts in Commuter Wallet database.
3. TDM manager or Interline/Lab Zero staff welcome each user.
4. Each user types their email address into the Commuter Wallet sign-in screen.
5. Each user receives a custom email with a "magic link" (which includes a special token)
6. After clicking on the "magic link" and opening it in a web browser on their desktop, laptop, or smartphone, the user is signed in to the Commuter Wallet. Their session will last for six months, or until they request to sign-out.

For the first deployment, these steps did not go as smoothly as planned. In one case, a software bug forced email addresses to be case sensitive (e.g., a user could not sign in to "Joe@City.gov" if the Commuter Wallet expected "joe@city.gov"). In other cases, a special exception had to be added to a city's spam blocking software to allow staff members to receive the "magic link" emails. As our deployment plan staggered the release of the Commuter Wallet to each city, we were able to address these issues rapidly, before the next round of users joined.

Support Channels

Based on our findings in the Design Sprint, we prepared the following support channels for the Commuter Wallet's users:

1. Email: staff commuters and TDM managers could email a centralized Commuter Wallet email address, which is backed by a help desk system (which assigns each email to a ticket, tracks responses, etc.)
2. In-app Messaging: when using the Commuter Wallet on a computer or a smartphone, staff commuters see a little chat icon in the lower right corner of the screen. At any time,

they can click the chat icon to start sending messages to Commuter Wallet support staff (managed by the same help desk system).

3. Through a TDM Site Manager: Staff commuters could contact their city's TDM manager in-person, by phone, or by email and the TDM manager would in turn connect to the Commuter Wallet help desk system.

Email channels and the TDM site manager intermediary were well used by staff commuters. However, no staff commuters used the In-App Messaging option during the FVC pilot of the Commuter Wallet. Given norms in the public sector, staff commuters may feel more comfortable emailing or calling to ask questions, as opposed to using a chat form.

Based on feedback from the pilot sites, in-person coaching from a TDM manager proved to be one of the most effective means of deploying and supporting use of the Commuter Wallet. (See the Human Resources Concierge Hypothesis in the Design Sprint section.)

> "[the most important support channel, according to onen TDM manager is] 'a person who can prod them through, explain the why'"

Feedback from Pilot Site Manages

After the deployment phase completed at each of the pilot sites, the FVC project managers collected additional feedback from TDM managers. A sample of comments and themes:

> "The Commuter Wallet is a fantastic tool for both TDM Coordinators and Benefit Managers alike. It allows for accurate trip planning including first and last mile segments and seamless interaction with commuter benefit options."

> "Introducing Commuter Wallet earlier in the [FVC project] as a tool for logging trips would have been more beneficial."

“

Asking employees to use too many apps/trip logging platforms. If there is no perceived difference between Commuter Wallet and RideAmigos, there is a redundancy between the two which confuses the users as to which they should actively use. In all honesty, the Commuter Wallet had a lot of potential to overtake RideAmigos as the primary trip logging/informational platform. But the lack of ‘robustness’ to deliver to participants from the get go hurt it. If users could see it as superior from the get-go, they would be acclimated to it sooner and allow it to be perfected with minor tweaks, rather than have it be tested in beta to get it to a more ‘deliverable’ state.

”

“

Great platform for multi-modal commutes as it served as a one-stop for viewing available commute benefits, plan trips and receive transit alerts.

”

Conclusions

Based on our experience designing, developing, and deploying the Commuter Wallet, we can share the following broad conclusions:

- Employees appreciate and deserve high-quality software experiences. The Commuter Wallet provides an integrative and carefully designed package of functionality, more like an engaging consumer application than a typical enterprise application. Users notice this attention to detail and find it encouraging.
- Information and incentives can only do so much if the right commute options don't exist. The Commuter Wallet is most useful when users are able to plan trips and discover benefits that meet their specific needs. Frequent, fast transit and other SOV-alternatives are necessary for competitive itineraries. (Other elements of the FVC project address this conclusion further.)
- There are many different times, places, and contexts for employers to provide commute benefits to their employees. The Commuter Wallet has opened up additional options beyond just new-employee onboarding and an annual enrollment period. In addition to these existing opportunities when employers broadcast information, the Commuter Wallet has information ready for employees when their own commute needs change and they want to discover more options.

Next Steps

Interline continues to operate the Commuter Wallet and are refining its design and development based on this deployment experience. Particular areas of focus include:

- Further simplifying the benefits data model: Based on the deployments, we can identify what specific information helps staff commuters make decisions.
- Smarter filtering of real-time alerts: We are considering ways to only show staff commuters real-time transit alerts that are relevant to their typical commutes, routes, etc.
- More Integrations: Now that we have a pattern for deep-linking, we are identifying more integration partners and discussing ways to add booking, payment, and other integrations into the Commuter Wallet.

We welcome questions about the Commuter Wallet's use in the FVC project and interest in redeploying the Commuter Wallet elsewhere.

Contact

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APPENDIX

6

E-Bike/Scooter Waiver

Pilot Electric Bicycle Policy and Procedures

Purpose

The City of Mountain View is making City-owned electric bicycles (e-bicycles) available for use by participants of the Mobility on Demand ("MOD") Employee Commute Pilot Program. E-bicycles are available for participating employees to use for two weeks at a time, the primary purpose of which is to provide alternatives to single-occupancy vehicles for employees' commutes to work, for example where the e-bicycle is used to ride to/from work or to/from transit stations. In order to support alternate commutes, use of the e-bicycles is also permitted to conduct City or personal business before, during, or after work that would otherwise require use of a single-occupancy vehicle. The use of the e-bicycle for conducting City or personal business is limited to those days on which participating employees are using the e-bicycle as part of an alternative to single-occupancy vehicle commuting.

E-Bicycle Use Policies and Procedures

To apply for an e-bicycle for a two week use, employees must complete and submit an application and waiver and release from liability form to the MOD Pilot Program Coordinator and contact the MOD Pilot Program Coordinator for availability and scheduling. Employees may extend their use period beyond two weeks if there are no other employees on the wait list to use an e-bicycle. The use of e-bicycles will be at no cost to the employee.

City e-bicycle riders *are required* to wear a helmet while operating a City e-bicycle. The City has provided helmets for this purpose; you may provide your own personal helmet or check one out from the City. City e-bicycle riders *are required* to wear closed toed shoes for safe bicycling.

An employee must not have any physical impediments or pre-existing medical conditions that prevent them from safely bicycling.

City e-bicycle riders must have a basic level of bicycling knowledge and must be able to safely and proficiently ride an e-bicycle. City e-bicycle riders must always operate the bicycle safely and courteously, and must follow the applicable rules of the road.

E-bicycles are stored in the City's bike locker room when not loaned to an employee. Each City-owned e-bicycle comes equipped with a helmet, lock, and rear and front lights. Prior to riding an e-bicycle, each rider is responsible for ensuring that the e-bicycle is in good working order and possesses all of its equipment.

Should an e-bicycle not be in good working order or if any of the e-bicycle's equipment is missing, the rider is responsible for immediately reporting these issues to the MOD Pilot Program Coordinator.

Participating employees are encouraged to bring a backpack or bag for carrying any necessary items.

City e-bicycle riders are *required* to satisfy City e-bicycle training requirements, which will be provided to employees by the City, prior to submitting their e-bicycle application.

City e-bicycle riders are responsible for proper use, care, and handling of the e-bicycle, including locking it when not in use. In the event that the e-bicycle is lost, stolen, or damaged, the rider is responsible for immediately notifying the police (if applicable) and the MOD Pilot Program Coordinator.

City e-bicycles may only be ridden by the employee to whom the e-bicycle checked out. City e-bicycle riders may not allow others to use an e-bicycle that is checked out to them.

City e-bicycle riders who ride outside of the City of Mountain View are responsible for knowing the applicable jurisdiction's e-bicycle laws, regulations and/or requirements. The rider is responsible for any violations of applicable laws while using a City e-bicycle.

The use of alcohol or drugs is prohibited with use of the e-bicycle.

The use of a wireless device is prohibited with use of the e-bicycle.

Additional Questions

Please contact the MOD Pilot Program Coordinator at sustainability@mountainview.gov.

PILOT ELECTRIC BICYCLE APPLICATION AND WAIVER

Instructions: Please complete this Form and submit it to the MOD Pilot Program Coordinator directly, by inter-office mail, or by e-mail (after printing, signing, and scanning) to sustainability@mountainview.gov.

Section A: Employee Information

Name: _____

City E-Mail: _____

Telephone: _____

Department: _____

Dates of use: _____/_____/_____ to: _____/_____/_____
If available, I am interested in extending my use of the e-bicycle beyond the dates above: ☐

Location: _____

Section B: Mobility on Demand Employee Commute Pilot Program Electric Bicycle (E-Bicycle) Policies

Signature below denotes Employee acknowledgment of the following Program conditions of participation.

- I understand that participation in this Program is voluntary and request to participate of my free will.
- I understand that I must apply to use an e-bicycle and complete and submit the Waiver and Release from Liability/Assumption of Risk Form and that I should contact the MOD Pilot Program Coordinator for availability and scheduling.
- I understand that I am required to wear a helmet and closed toed shoes while operating the e-bicycle.
- I attest that I do not currently have any impediments or conditions that prevent me from safely operating an e-bicycle.
- I attest that I have a basic level of bicycling knowledge and am able to safely and proficiently ride an e-bicycle. I accept that I may be asked to demonstrate my ability to safely and proficiently operate the e-bicycle at any time.
- I understand that I am always expected to operate an e-bicycle safely and courteously, and that I must follow the applicable rules of the road.
- I understand that I am responsible for ensuring that the e-bicycle is in good working order and possesses all of its equipment, and that if this is not the case I am responsible for immediately reporting these issues to the MOD Pilot Program Coordinator.
- I have satisfied the City's e-bicycle training requirements.
- I understand that I am responsible for proper use, care, and handling of the e-bicycle, including locking it when not in use. I understand that if the bicycle is lost, stolen or damaged, I am responsible for immediately notifying the police (if applicable) and the MOD Pilot Program Coordinator.
- I acknowledge that I will not allow others to use an e-bicycle that is checked out to me.

- I understand that if I ride the e-bicycle outside of the City of Mountain View that I am responsible for knowing the applicable jurisdiction's e-bicycle laws, regulations and/or requirements and that I am responsible for any violations of applicable laws while using a City e-bicycle.

- I understand that I am prohibited from using alcohol or drugs while operating the e-bicycle.

- I understand that I am prohibited from using a wireless device while operating the e-bicycle.

- I understand that failure to abide by these policies may result in my being temporarily or permanently removed from participating in the MOD Pilot Program.

Employee Signature _____ Date: _____

Asst. City Manager's Signature _____ Date: _____

CITY OF MOUNTAIN VIEW PILOT ELECTRIC BICYCLE PROGRAM

WAIVER AND RELEASE FROM LIABILITY / ASSUMPTION OF RISK

I have voluntarily agreed to participate in the City of Mountain View's Mobility on Demand Employee Commute Pilot Program, in which the City of Mountain View is making City-owned electric bicycles (e-bicycles) available for use by participating City Employees to use as an alternative to single occupancy vehicle commuting, where the e-bicycle is used to ride to/from work or to/from transit stations. In order to support alternate commutes, use of the e-bicycles is also permitted to conduct City or personal business before, during, or after work that would otherwise require use of a vehicle. Use of the e-bicycle for City or personal use is limited to those days on which participating employees are using the e-bicycle as part of an alternative to single occupancy commuting.

In consideration of my participation in the City of Mountain View's Mobility on Demand Employee Commute Pilot Program, I hereby agree to release the City of Mountain View, its officers, agents, and employees from any and all claims, obligations, causes of action, and liability of any kind arising from my participation in this activity. This release is intended as a full and complete release covering any possible claims, contingent or otherwise, involving personal injury or property damage which may arise in connection with my participation in this activity, which includes use of the e-bicycle for conducting personal business. I understand that there is an inherent level of risk for injury or even death when riding an e-bicycle, even when much care is taken to make the activity safe. Knowing these inherent risks, nevertheless, I hereby assert that using an e-bicycle as part of my participation in the City of Mountain View's Mobility on Demand Employee Commute Pilot Program is voluntary and I thereby assume those risks and release, indemnify, and hold harmless the City of Mountain View and all of the agents and persons mentioned above who (through negligence or carelessness) might otherwise be liable to me or any heirs or assigns for damages; other than acts of gross negligence or willful misconduct. I understand that this waiver, release and assumption of risk is binding on me and my heirs and assigns. Nothing herein shall be construed as a waiver or release of any right to receive worker's compensation benefits to which I may be entitled in the event I am injured in the course and scope of my employment.

I also understand I must be in good physical health to use an e-bicycle as part of my participation in the City of Mountain View's Mobility on Demand Employee Commute Pilot Program, and I would not have elected to use an e-bicycle if I had any physical impediments or pre-existing medical conditions that would prevent me from safely bicycling. I have read and acknowledge the City of Mountain View's Mobility on Demand Employee Commute Pilot Program Electric Bicycle Policies, and understand that the City of Mountain View requires me to wear a helmet and use other protective gear, if necessary, while operating a bicycle.

I further expressly agree that the foregoing waiver, release and indemnification is intended to be as broad and inclusive as is permitted by the law of the State of California and that if any portion therefore is held invalid, it is agreed that the balance shall, notwithstanding, continue in full legal force and effect. I understand my signature is a legal and binding signature and will be considered original if received by fax or electronic signature.

Signature: _____

Print Name: _____

APPENDIX

7

Employee Incentive Advice Memo

Mobility on Demand
Fair Value Commuting (FVC) Demonstration

Pilot Partner Program
Employee Incentive Advice

The purpose of this memo is to provide suggestions for offering employee incentives through a TDM program. Specifically, FVC Pilot Partner Commute Champions may potentially find this useful when developing their Pilot Program and determining how to incentivize their employees.

This advice represents a snapshot in time of current practice collected from recent, relevant listserve postings and conference presentations given by commute benefits professionals across the U.S. Therefore, it is possible that individual advisory statements may conflict. That is acceptable and we recommend using the FVC Pilot Program to experiment what works best for each employer. We have noted several valuable sources of information below for additional reference.

Programming

- Make programs flexible, so employees have an incentive to take any alternative commute method and to participate part-time or full-time.
- Prorate benefits according to how frequently employees use alternative modes.
- Include employees in program development and planning to help identify and address practical and equity concerns.
- Provide TDM infrastructure improvements in conjunction with the program, including workplace parking for bicycles, carpool parking, or local transit improvements.
- Offer bonus incentives to limit trips taken to and from work, such as telecommuting.

Trip Logging

- Make it difficult for employees to fake self-reporting by integrating multiple apps into RideAmigos that require data or passively detects commutes to "verify" their trip:
    - Apps that integrate include Strava, Waze Carpool, and Scoop
    - CommuteTracker is a trip verifier which can confirm bulk trips every week or so, so the employee does not get "data entry fatigue"
- Only allow participants to log 2 commutes a day so they cannot log non-work commutes.
- Develop a method to verify employee trips if they win prizes.

Cash Prizes

- Offering very large cash-based prizes for logging commute trips could result in fraudulent logging, avoid this by offering smaller, more frequent prizes.

- External rewards work best for routine activities, such as reinforcing people who already do the behavior, but works less to get new riders to change behavior.
- However, limited-time incentives can act as a catalyst because of high promotion and/or a larger prize, but is not sustainable long-term. Offer both to maintain people in the program.
- Do not base prizes on total commutes logged and instead do random drawings with smaller prizes. This way, people who may not use an alternative mode everyday can get rewarded too.
- Rewards and raffles are best for stretching the budget - most people will go for the raffle instead of cash amount every day.
- Make raffles for frequently active riders rather than awarding the top performer.

Internal Rewards

- Targeting: use baseline data to target mode shift and understand the employees' different motivations.
- It's important to know the common incentives available already to the employee, including free fare days on transit, HOV lanes (which work well during rush hour), safe driving bonuses, and free EV charging.
- Develop internal rewards for employees, such as challenges with co-workers, where they internalize rewards and reinforcements on actions (reminders, gold stars, etc) to build a community and enforce positive behavior change.
- Normalize alternative modes in the office by integrating them into work culture. Form a "Commuter Club" employees can join to share advice and socialize. Promote programs by showing a video.
- Offer non-cash titles for the top performer or use funds dedicated to commute behavior to throw a celebratory party for all employees instead of giving cash away to one top performer.
- Introductory "Try It" incentives: Offer incentives that encourage potential users to try the new program. These incentives could include "Bring-a-friend" to encourage current users to tell friends and colleagues about the program.

References:

- TRANSP-TDM University of South Florida email distribution list, "Bike Commuter Challenge Cash Incentives" thread, via TRANSP-TDM@LISTSERV.USF.EDU (Subscribe to receive advice from other TDM programs on successes, challenges, and strategies.)
- Corey Tucker, RideAmigos, Presentation at CommuteCon 2019, Incentives Work! (Sort of): Exploring ways to make incentives work better and budgets go further
- Best Workplaces for Commuters, "Marketing Commuter Benefits to Employees", 2005. (The BWC is a program sponsored by the US EPA and US DOT.)
- Association for Commuter Transportation, "The TMA Handbook: A Guide to Successful Transportation Management Associations". (The ACT is a non-profit organization supporting TDM programs.)
- Victoria Transport Policy Institute, Commuter Financial Incentives, TDM Encyclopedia, 2017. (The VTPI is an independent research organization and provides comprehensive online resources to help improve transportation planning and policy analysis.)

APPENDIX

8

Gap Analysis

Mobility on Demand
Fair Value Commuting (FVC) Demonstration

Gap Analysis Memo
January 3, 2020

1. Introduction and Summary

The Gap Analysis Task is part of the Palo Alto Mobility on Demand Fair Value Commuting Demonstration Project (FVC Project). This memo presents recommendations for reducing or filling first/last-mile gaps identified through an analysis of employee home and work locations. The analysis seeks to answer the primary question, "how many employees would have a reasonable transit commute compared to driving if they were to have access to a micromobility mode?"

The analysis leverages modern trip planning software to generate realistic intermodal commute trip itineraries for each employee for walk-to-transit, micromobility-to-transit, and drive-to-transit mode combinations, and compares those itineraries to a baseline driving itinerary. A "reasonable" transit trip is defined as taking up to twice as long as driving, and costing up to the same as driving. Micromobility modes include individual-use bikes, e-bikes, or e-scooters (whether owned by the employee or loaned to the employee by their employer); or hypothetical[1] access to bikeshare, e-bikeshare, or e-scootershare systems. The analysis also explores the potential for employees to commute to work directly using micromobility.

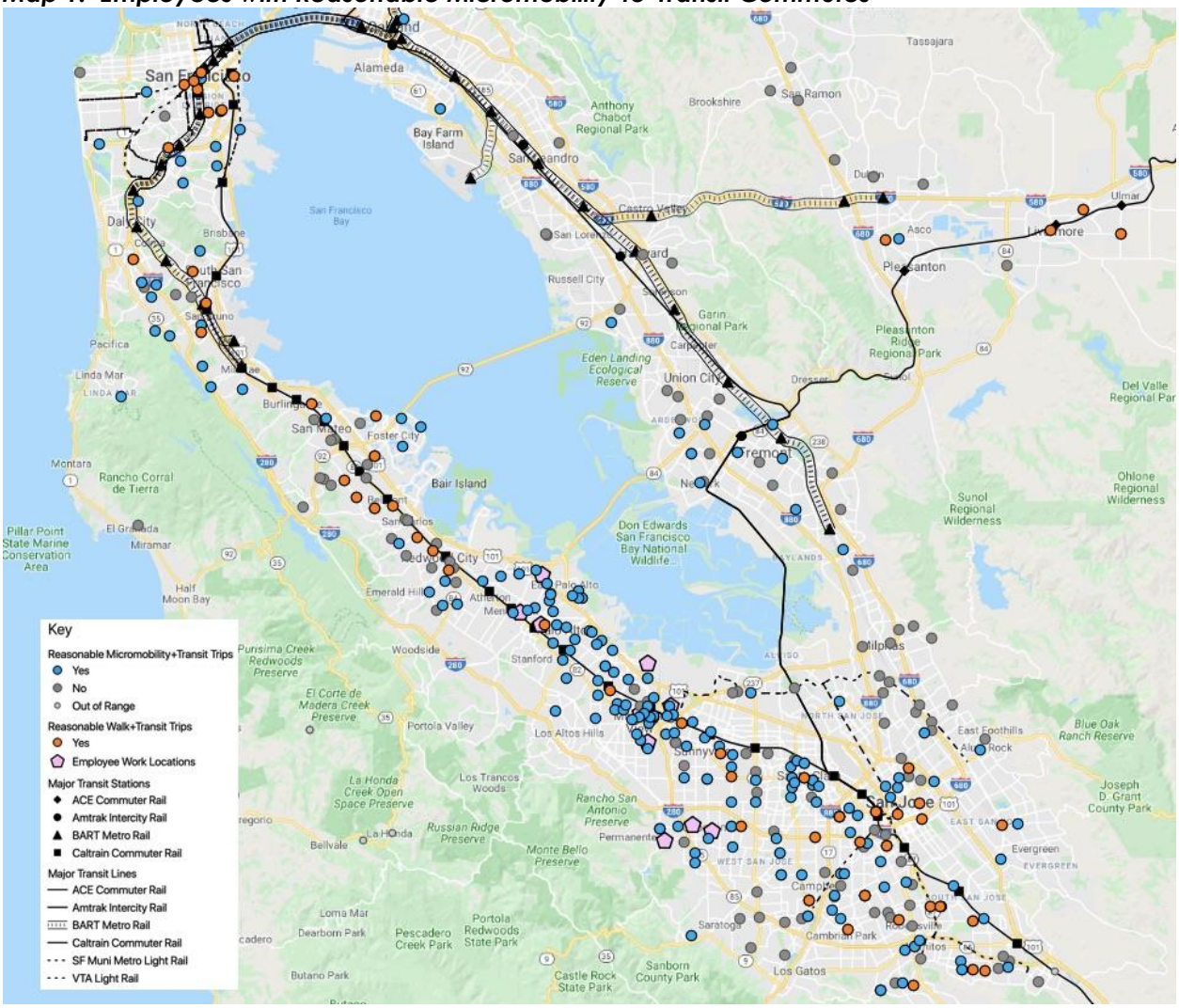
The analysis concludes that, as a baseline, 15% of the employees analyzed could have a reasonable commute if they walk to transit. However, use of micromobility modes to fill first/last mile gaps would increase that percentage to 58%, almost 3 times as many employees (a 387% increase). This substantial increase in competitiveness is attributed to the longer first/last mile distances and higher first/last mile travel speeds afforded by micromobility, combined with low cost. Map 1 below shows how many more employees could have reasonable transit commutes using micromobility (blue dots) compared to those who could walk to transit (orange dots). Further, of the 61% of employees who drive alone now, more than half of them (34% of all employees) could potentially switch to a reasonable commute by transit.

While this analysis does not predict actual transit ridership, it illustrates the high potential for the use of micromobility modes to fill first/last mile connections to transit. Stakeholders are recommended to advocate for, incent, or provide gap-filling micromobility solutions; and to expand the provision of infrastructure to support safe travel by micromobility modes.

[1] Many of the pilot partner employees currently do not have access to a shared micromobility system, but this analysis assumes the universal availability of shared micromobility systems in order to determine the potential benefit of those systems if they were to be deployed.

Following this summary, this memo contains sections on Approach, Analysis Results, and Recommendations, followed by a series of appendices, namely: Appendix A: Employee Commute Origins; Appendix B: Assumptions; Appendix C: Commute Cost Assumptions with Sources; Appendix D: Commute Distance Sources; and Appendix E: Itinerary Data Fields.

Map 1. Employees with Reasonable Micromobility-to-Transit Commutes



2. Approach

Prospect Silicon Valley (ProspectSV), supported by Interline Technologies, identified potential gaps by analyzing trip itineraries generated using trip planning software. The overall process consisted of the following primary steps: collecting geographic inputs from employee surveys; generating trip itineraries, categorizing trip itineraries for competitiveness, and analyzing the competitive trip itineraries.

The analysis inputs are anonymized survey results collected from employees who work at any of the four FVC pilot employer sites (the Cities of Palo Alto, Mountain View, Menlo Park, and Cupertino) and who reported their typical starting (origin) location and ending (destination) location. A total of 444 origin-destination (OD) pairs remained after discarding incomplete

location information from the original set of 504 survey responses. The 444 OD pairs represent approximately 31% of the surveyed employee population. Each origin and destination was then geocoded into a set of latitude and longitude coordinates.

Using OpenTripPlanner software, the Google driving routing engine, and custom scripts written by Interline, multiple trip itineraries were generated for each of the OD pairs, for multiple first/last mile modes, for both home-to-work and work-to-home trips. For every home-to-work trip and work-to-home trip, the following types of modal itineraries were generated:

A. First/last mile modes to and from transit: drive, walk, bike, e-bike, e-scooter, bikeshare, e-bikeshare, e-scootershare
B. Direct commutes to work: drive, walk, bike, e-bike, e-scooter, bikeshare, e-bikeshare, e-scootershare

In total, approximately 26,000 itineraries were generated. Every itinerary specified the following: start and end location; start time; total travel time; total travel cost; a summary description of the progression of modes used throughout the trip; access mode, time, and distance; transit vehicle time; transfer walk time and distance (if applicable); transfer wait time (if applicable); and egress mode, time, and distance. See **Appendix E: Itinerary Data Fields** for a complete list of fields. Drive itineraries were supplied using the Google Maps API. Drive to transit itineraries combined Google Maps itineraries to park and ride lots and transit stations with OpenTripPlanner transit itineraries. All assumptions for each mode, such as travel speed and cost, are recorded in **Appendix B: Assumptions**.

"Null" or blank itineraries were generated to represent unfulfilled trips in the cases that employees live beyond the range of the requested mode, for example if an employee lives beyond biking range from their work location or from the nearest bus stop. In all, 68% of employees live beyond micromobility range for a direct commute to work, 24% are out of walking range of any transit stop or station, and 8% are out of micromobility range of any transit stop or station.

ProspectSV then categorized each trip itinerary for competitiveness to driving to work. An itinerary was considered "reasonable" or competitive if the travel time was equal or less than twice the driving time, and if the travel cost was equal or less than driving cost. Interline generated three trip itineraries per mode; the itinerary with the shortest travel time per mode was selected for the determination.

Finally, ProspectSV matched the competitive home-to-work itineraries with competitive work-to-home itineraries to determine which employees would have competitive trips in both directions, for each mode. Each mode would only be considered competitive if both directions were competitive. The competitive micromobility modes were then grouped together and compared with competitive walking to transit itineraries. Separately, competitive drive to transit itineraries and direct to work micromobility itineraries were also identified. The results of the analysis are reported in the next section below.

3. Analysis Results

This section describes the results of the gap analysis, starting with first/last mile trips (organized with overall results first followed by employer-specific results), and ending with results of direct-to-work trips.

First/Last Mile Gap-Filling Opportunities

Table 1 below displays the percentages of employees who were determined to have reasonable transit trips ("Yes") using the same first/last mile mode (walk, drive, or micromobility) for both home-to-work and work-to-home directions. "No" indicates the percent of employees who have first/last mile to transit itineraries identified, but whose itineraries are non-competitive (would take too long compared to driving alone to work, would be too expensive compared to driving, or both). "Out of range" is the percent of employees who live in a location that is too far for them to connect to any form of transit (using the maximum distance assumptions for each mode).

Specifically, Table 1 contains a comparison between walk-to-transit trips, drive-to-transit trips, and micromobility-to-transit trips as a group. Micromobility is counted "Yes" if an employee has a reasonable transit trip using at least one of the six micromobility modes analyzed. Maps 2, 3, and 4 below illustrate the geographic distribution of the walk-to-transit trips, drive-to-transit trips, and micromobility-to-transit trips, respectively.

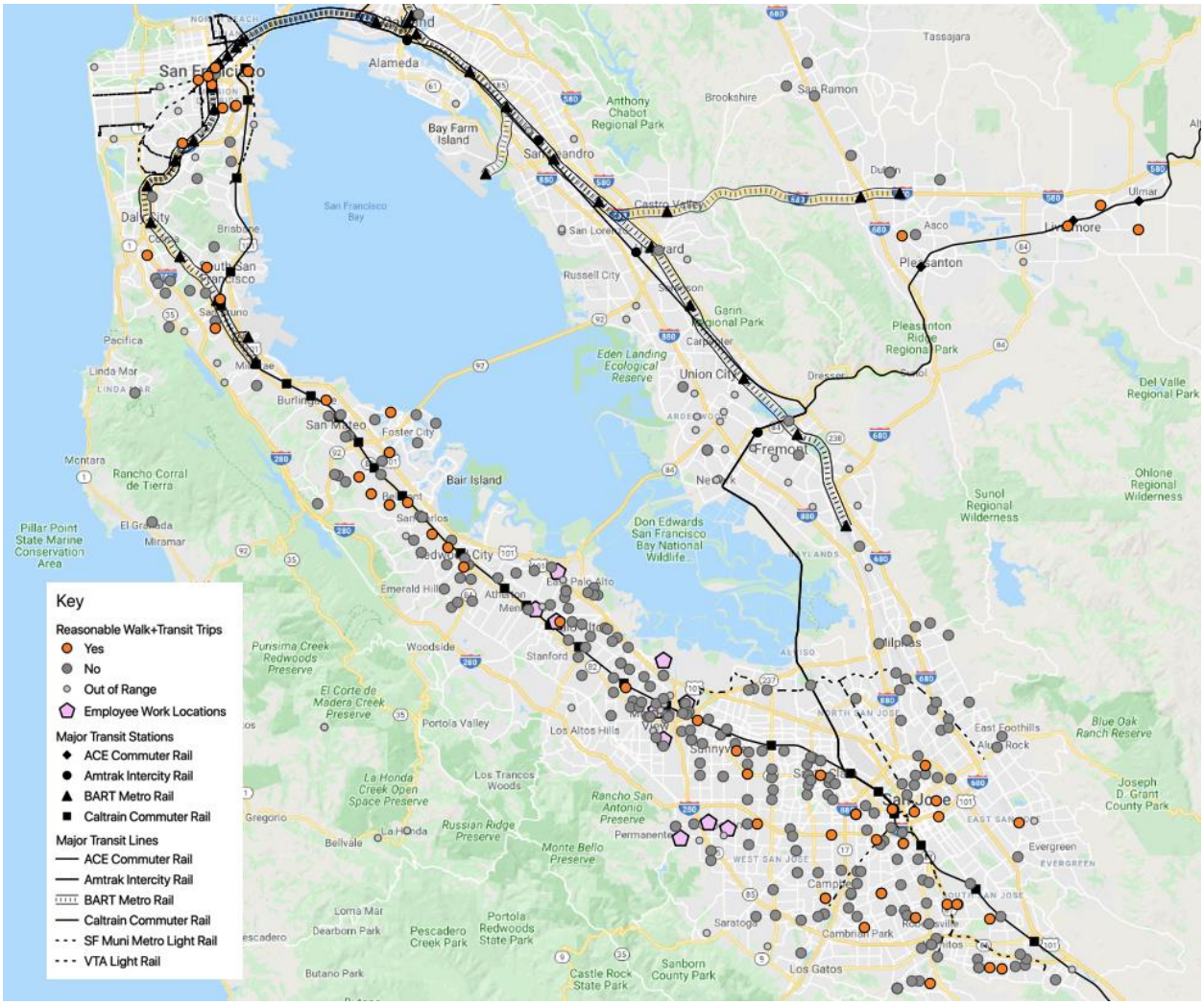
Table 1. Comparison of Transit Trip Opportunities by First/Last Mile Mode

	Percent of Employees by Mode to/from Transit		
Reasonable Trip?	**Walk-to-Transit**	**Drive-to-Transit**	**Micromobility-to-Transit (at least one mode)**
Yes	15 (%)	26 (%)	58 (%)
No	61	66	34
Out of Range	24	8	8

The fewest employees (15%) would have reasonable walk-to-transit trips; another 61% of employees could possibly walk to transit but would have an unreasonable travel time, typically because they could walk to a local bus stop but would need to spend extended time on local transit and then transfer to higher-order transit. Approximately 24% of employees would not be able to reach any form of transit at all by walking. Driving to transit offers opportunity for more employees (26%), however even though the reach of transit is increased, still 66% of employees would not have a reasonable drive-to-transit commute due to travel time or cost.[2] The micromobility modes as a group provide a dramatic increase in transit trip competitiveness (58% of employees) compared to both walk-to-transit and drive-to-transit.

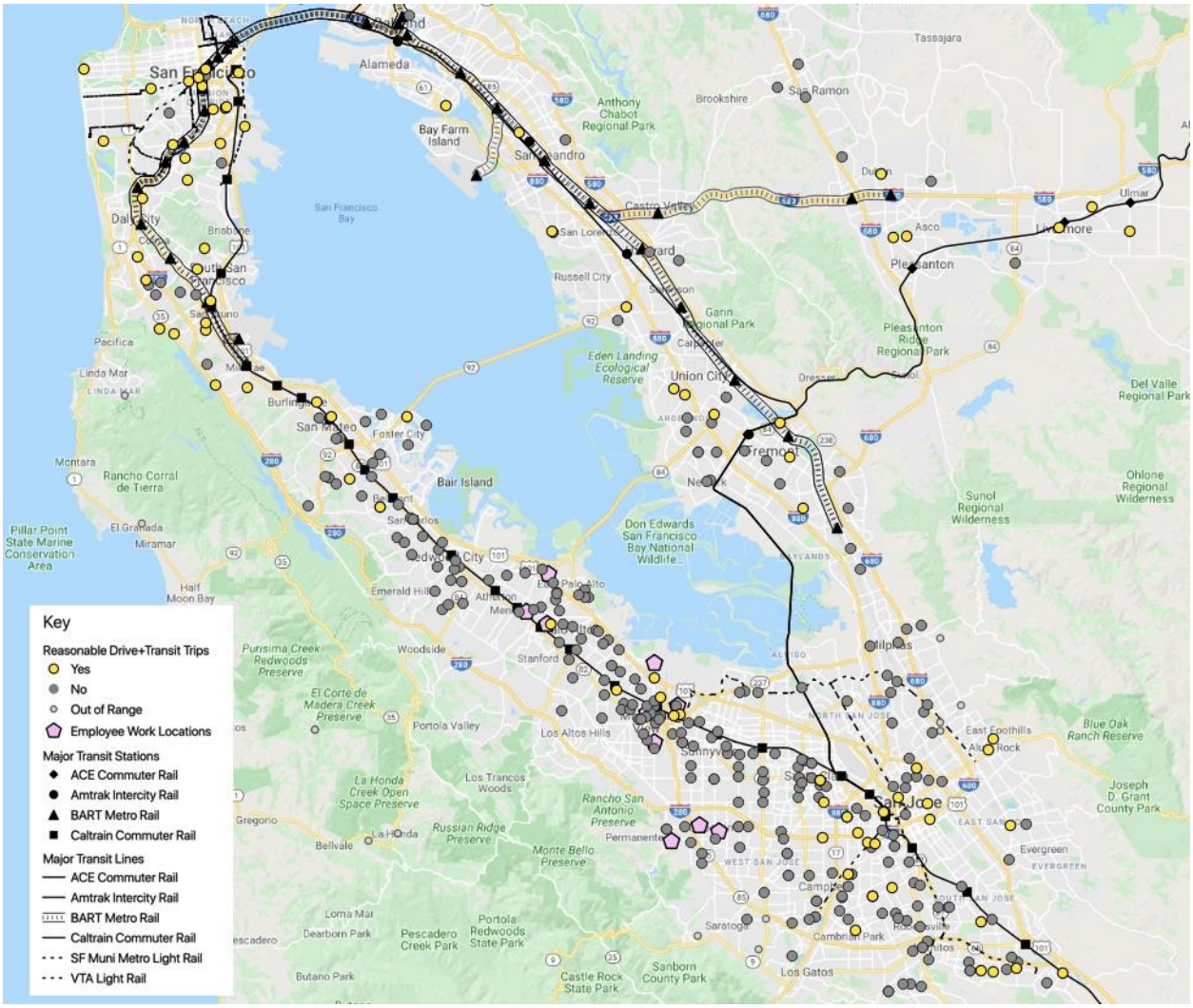
[2] Note that parking costs for any driving trips were not included in the analysis, whether for drive-to-work or drive-to-transit.

Map 2. Employees with Reasonable Walk-to-Transit Commutes



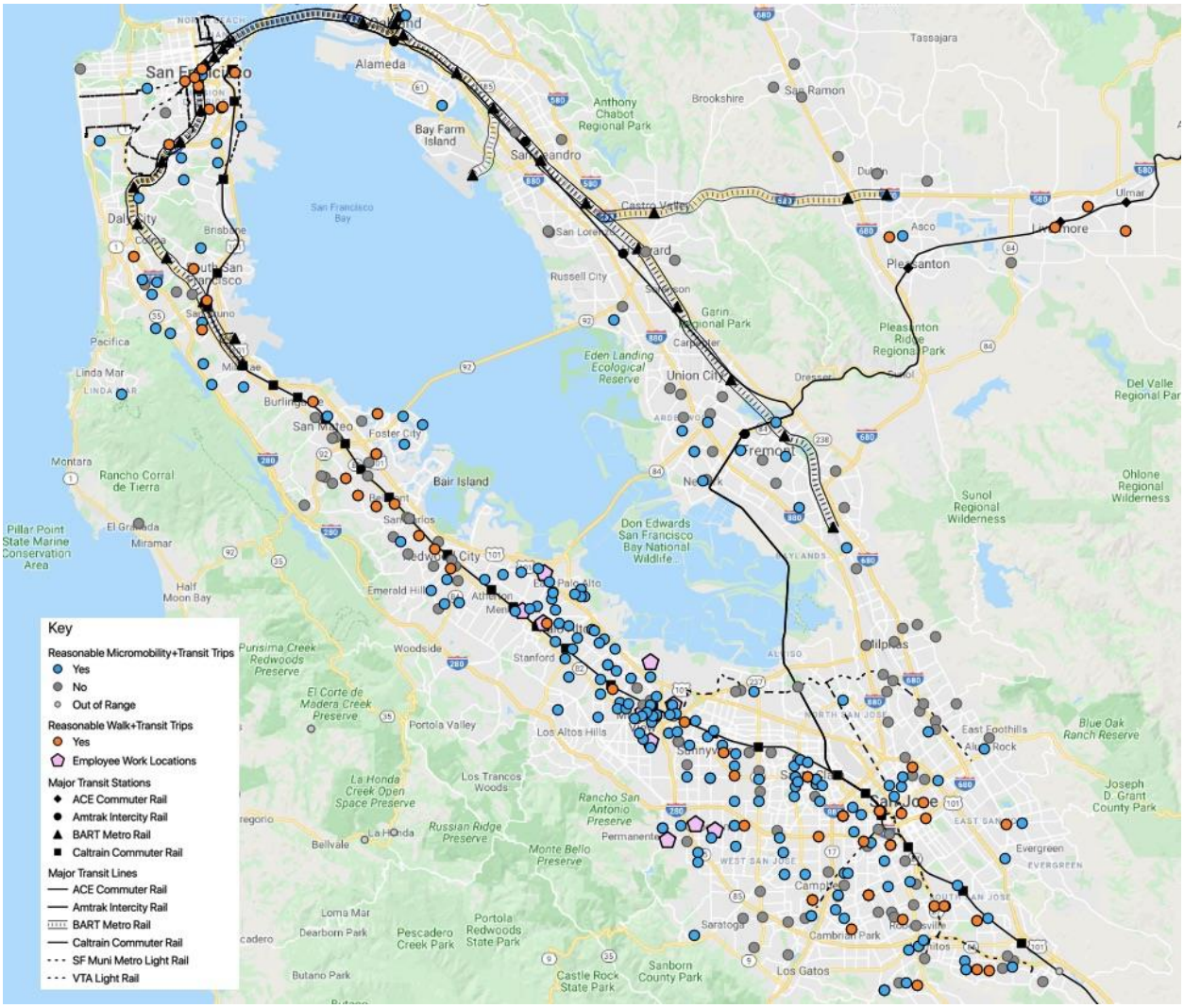
In Map 2, generally employees who live very close to major transit lines (rail-based or frequent bus) have competitive walk-to-transit trips. Notable transit lines include Caltrain and ACE (Altamont Commuter Express) commuter rail, BART (Bay Area Rapid Transit metro), and San Francisco Muni and Santa Clara Valley Transportation Authority light rail.

Map 3. Employees with Reasonable Drive-to-Transit Commutes



In Map 3, the distribution of employees with reasonable drive-to-transit trips is expanded and different than walk-to-transit. These employees primarily live farther away from major transit lines and would be able to drive and park at a park-and-ride lot or transit station.

Map 4. Employees with Reasonable Micromobility-to-Transit Commutes



Map 4, which is the same as Map 1, displays the dramatic increase in reasonable transit trips using micromobility (blue dots) compared to walk-to-transit (orange dots). Many more employees along BART, Caltrain, and VTA lines have competitive trips. Also notable is the increase in the Fremont/Newark area, presumably because of better access to the Dumbarton Express bus services. Employees with dark gray dots do not have reasonable walk-to-transit or micromobility-to-transit itineraries, and a few employees (smaller light gray dots) live beyond the range of micromobility-to-transit modes. For graphic readability, the map omits some employees who live farther away, including the Central Valley, Santa Cruz, and south Santa Clara County (Morgan Hill and Gilroy), however those employees are included in all tabular results.

Table 2 provides a breakdown of the six micromobility-to-transit modes analyzed, including individual-use bike, e-bike, and e-scooter; and hypothetical bikeshare, e-bikeshare, and e-scootershare systems. An individual-use mode is defined as a vehicle that is designated for the employee's sole use, for example owned by the employee or assigned/loaned to the employee by their employer. Shared systems consist of docked or free-floating fleet vehicles that are used

by an individual one trip at a time and are then available for other users at other times. The table also includes a tabulation for each category, indicating how many employees could have a reasonable micromobility-to-transit trip using at least one individual-use mode or at least one shared mode.

Trip itineraries used the assumed maximum distance, travel speed, and cost for each mode as detailed in **Appendix B: Assumptions**. Generally, the individual-use modes assumed lower operational cost and longer range compared to the shared modes, which assumed per-trip rental costs and lower range.

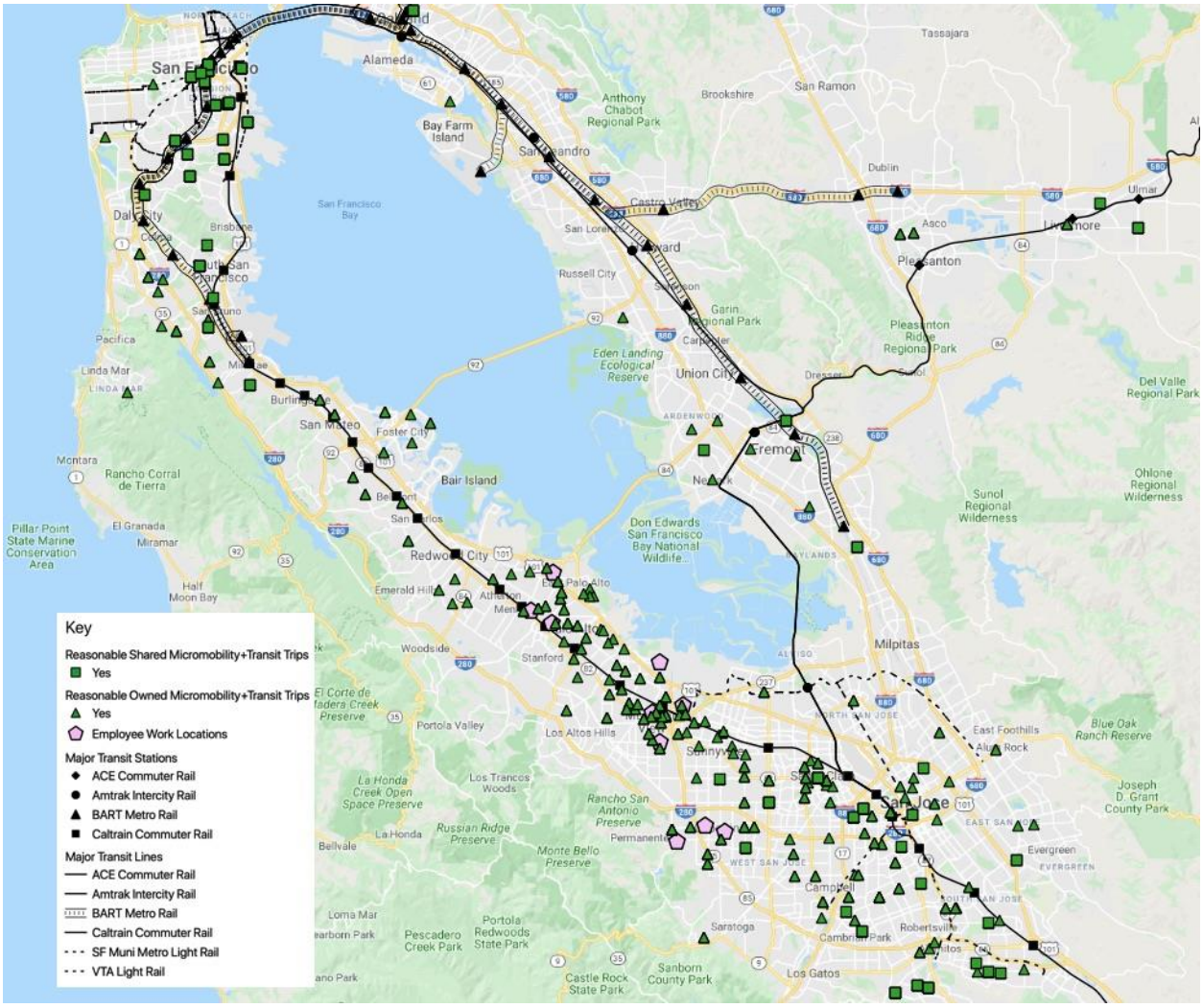
Table 2. Transit Trip Opportunities by First/Last Mile Micromobility Mode

	Percent of Employees by Micromobility Mode to/from Transit							
	Individual-Use Modes				**Shared Modes**			
Reasonable Trip?	**Bike**	**E-bike**	**E-scooter**	**At least one**	**Bikeshare**	**E-bike share**	**E-scooter share**	**At least one**
Yes	32 (%)	54 (%)	39 (%)	58 (%)	13 (%)	10 (%)	11 (%)	15 (%)
No	50	38	44	34	71	74	71	69
Out of Range	17	8	16	8	16	16	17	16

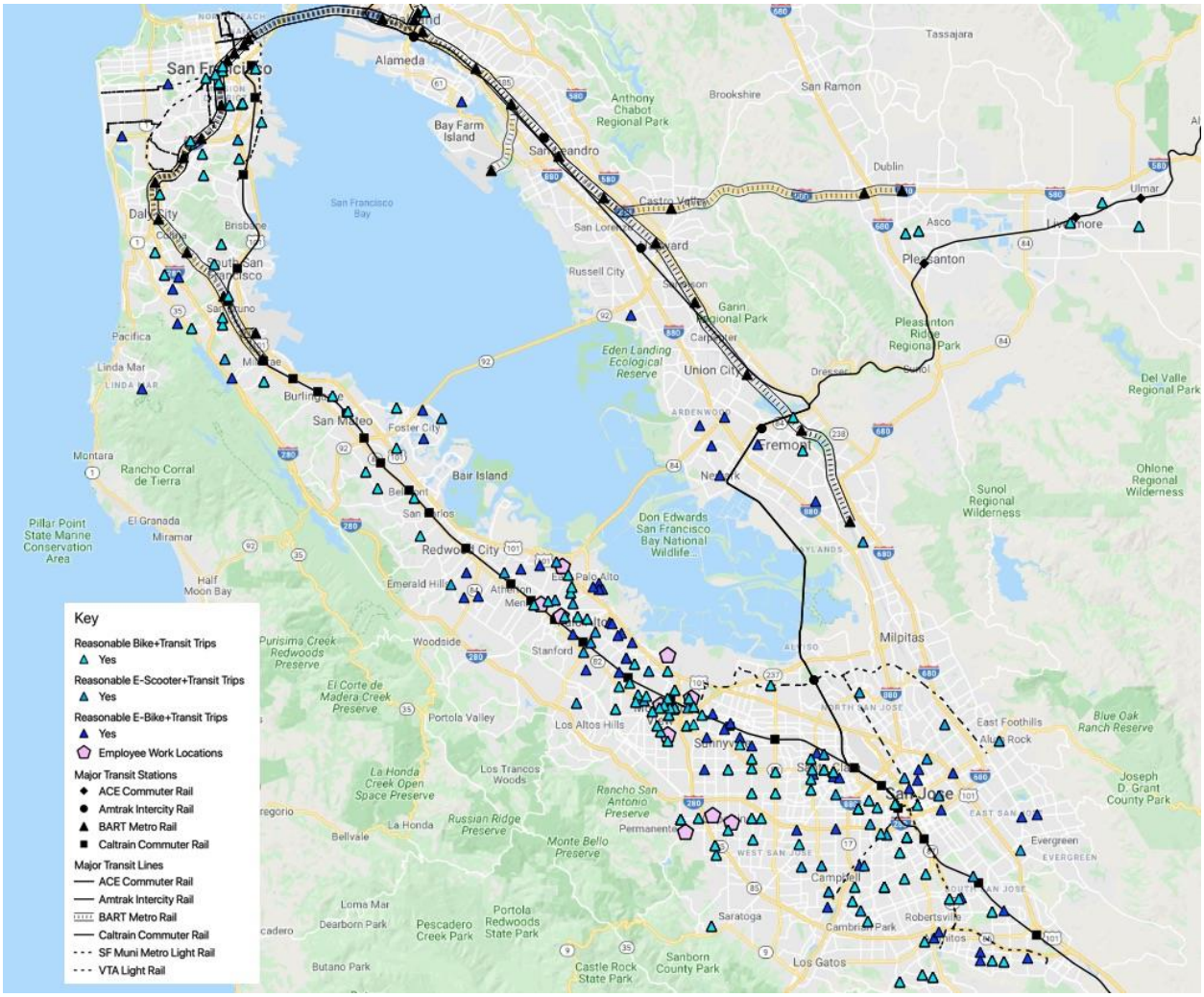
Amongst all the micromobility-to-transit modes, individual-use e-bikes provide the most reasonable transit trips because of their high range, high speed, and low cost. The high e-bike range reduces the percentage of employees who live out of range compared to all the other micromobility modes. The team also observed that e-bikes allow more optimized transit choices, for example given the same departure time from home, with a fast bike an employee could catch the next Caltrain Baby Bullet train, instead of walking and settling for a slower local train. The individual bike and e-scooter modes also increase the number of employees who would have reasonable transit trips, but not as much as e-bike. The shared micromobility modes enable a similar geographic reach as the bike and e-scooter, however due to higher rental costs that compare unfavorably to driving, a smaller percentage of employees would have reasonable commutes using shared modes. Note, all employees who could have a reasonable shared micromobility trip to transit could also have a reasonable individual-use micromobility trip to transit.

Map 5 displays the distribution of reasonable trips by individual-use or shared micromobility-to-transit modes. Map 6 further illustrates the differences between the individual-use modes and Map 7 illustrates the differences between the shared modes.

Map 5. Micromobility-to-Transit Commutes, Individual-Use and Shared

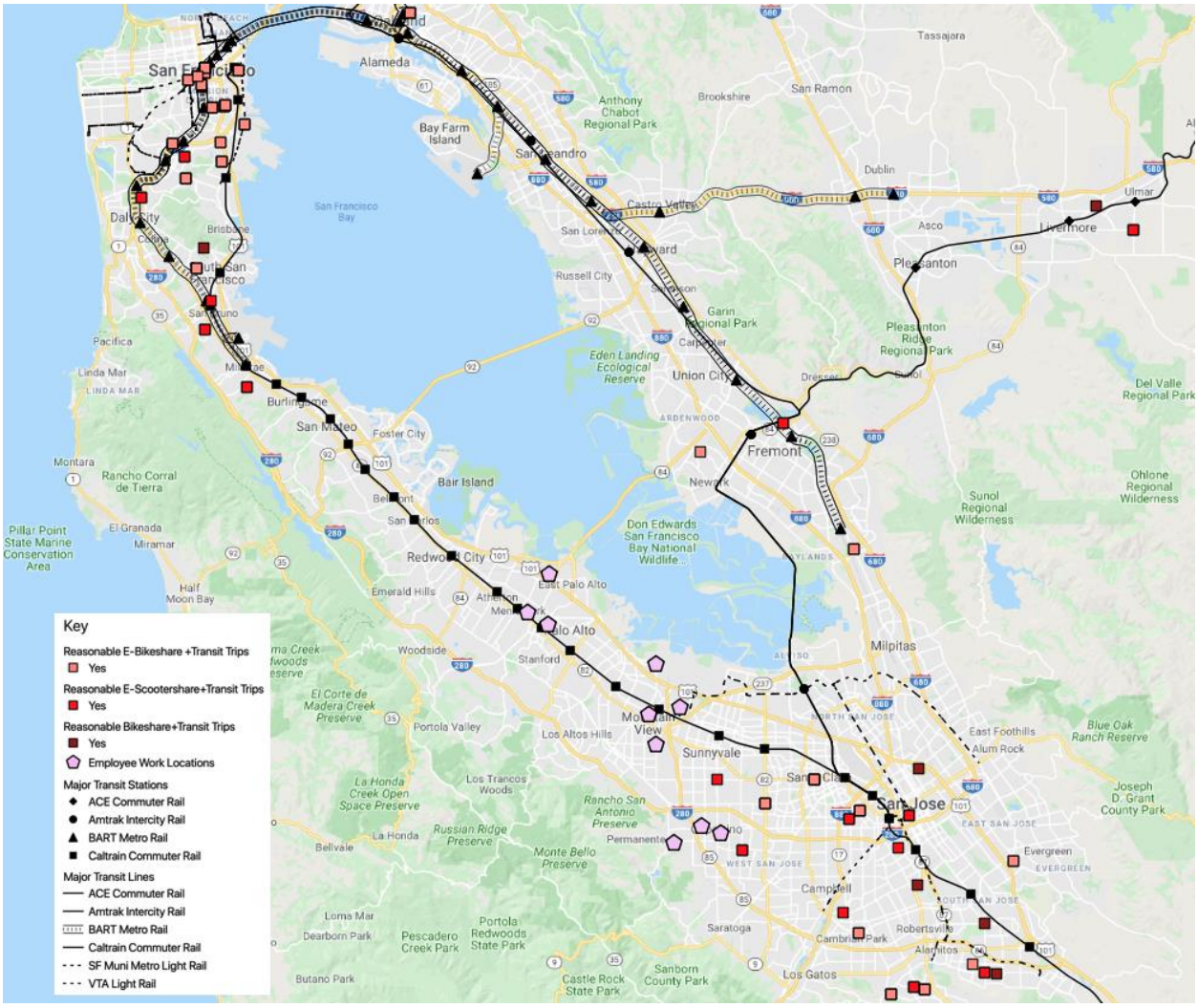


Map 6. Micromobility-to-Transit Commutes, Individual-Use Modes



The individual-use e-bikes are more distant from major transit lines/stations, while individual-use e-scooters are generally concentrated closer to transit lines, consistent with each mode's assumed maximum travel distances. There are clusters of reasonable bike trips in Mountain View, Palo Alto, San Francisco, and San Jose, possibly around more frequent-service transit stations that are closer to home/work destinations.

Map 7. Micromobility-to-Transit Commutes, Shared Modes



The reasonable shared micromobility trips are clustered in the San Francisco and San Jose regions, which coincide with a large prevalence of existing bikeshare, e-bikeshare, and e-scootershare companies (but as a hypothetical analysis, the existence of those systems was not considered). There are more e-bikeshare and e-scootershare reasonable trips than bikeshare.

First/Last Mile Modes by Employer

The following subsections break down the results for each of the four pilot partner employers, the Cities of Palo Alto, Menlo Park, Mountain View, and Cupertino (each municipal government participated in the role of employer). The table and map for each employer mimics Table 1 and Map 1, but is specific to that employer.

The three employers (Cities of Palo Alto, Menlo Park, and Mountain View) that are primarily located about a ½ mile or less from their respective Caltrain commuter rail stations share relatively similar characteristics. The City of Cupertino, which is located 4.5 miles from the nearest Caltrain station, has much lower ratios of reasonable transit commutes. However, the increase in

potential transit commutes from the use of micromobility is similarly remarkable to the other cities.

First/Last Mile Modes by Employer: City of Palo Alto

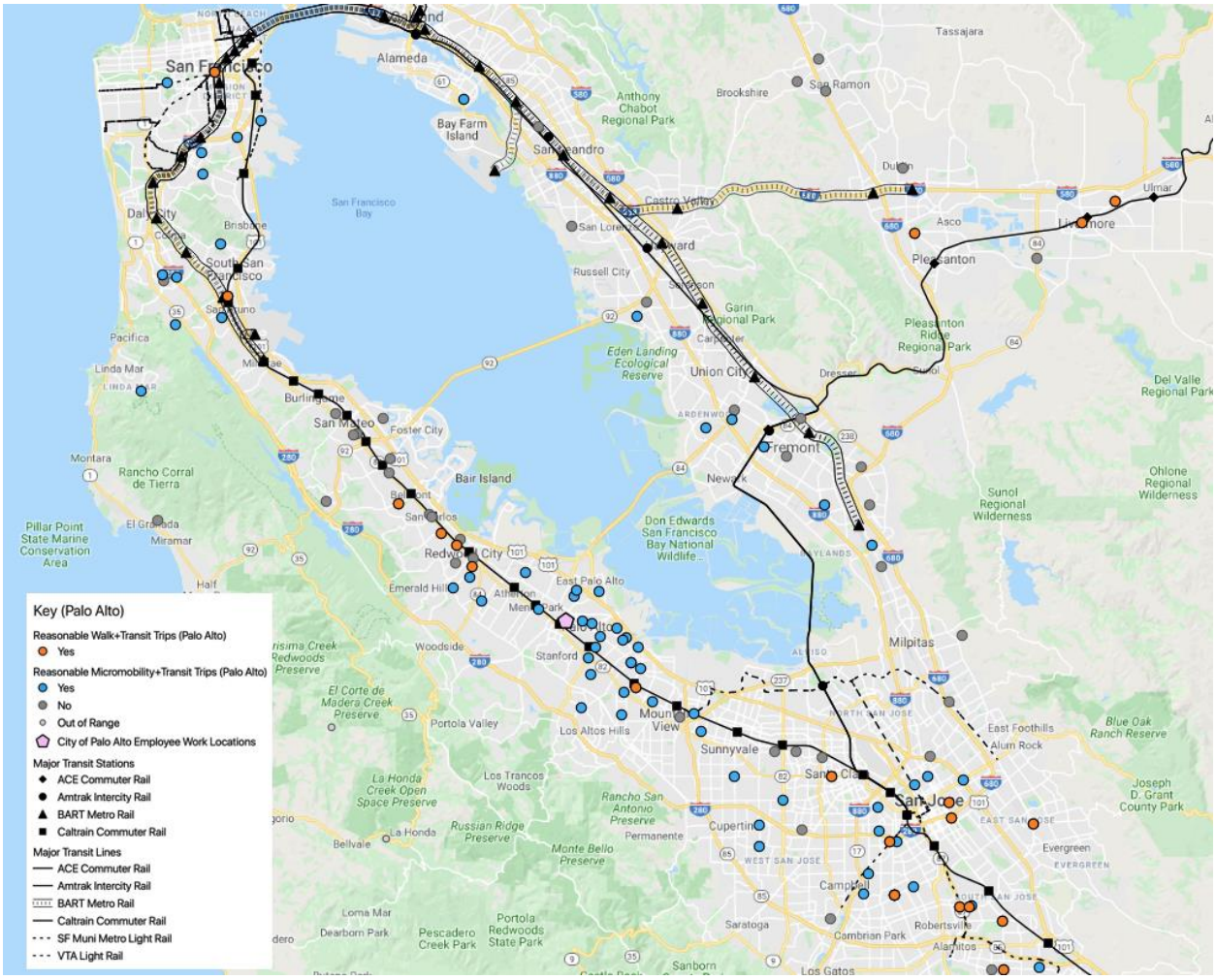
This section presents results for City of Palo Alto employees. Table 3 shows the comparison between walk-to-transit, drive-to-transit, and micromobility-to-transit modes for employees and Map 8 displays the geographic distribution of employees with reasonable walk-to-transit and micromobility-to-transit commutes.

Table 3. City of Palo Alto Employee Transit Trip Opportunities by First/Last Mile Mode

	Percent of Employees by Mode to/from Transit		
Reasonable Trip?	**Walk-to-Transit**	**Drive-to-Transit**	**Micromobility-to-Transit (at least one mode)**
Yes	16 (%)	34 (%)	59 (%)
No	58	59	33
Out of Range	26	7	9

Compared to the overall results, approximately the same proportion of City of Palo Alto employees have reasonable walk-to-transit and micromobility-to-transit trips and about 8% more employees have reasonable drive-to-transit trips.

Map 8. City of Palo Alto Employees with Reasonable Micromobility-to-Transit Commutes



First/Last Mile Modes by Employer: City of Menlo Park

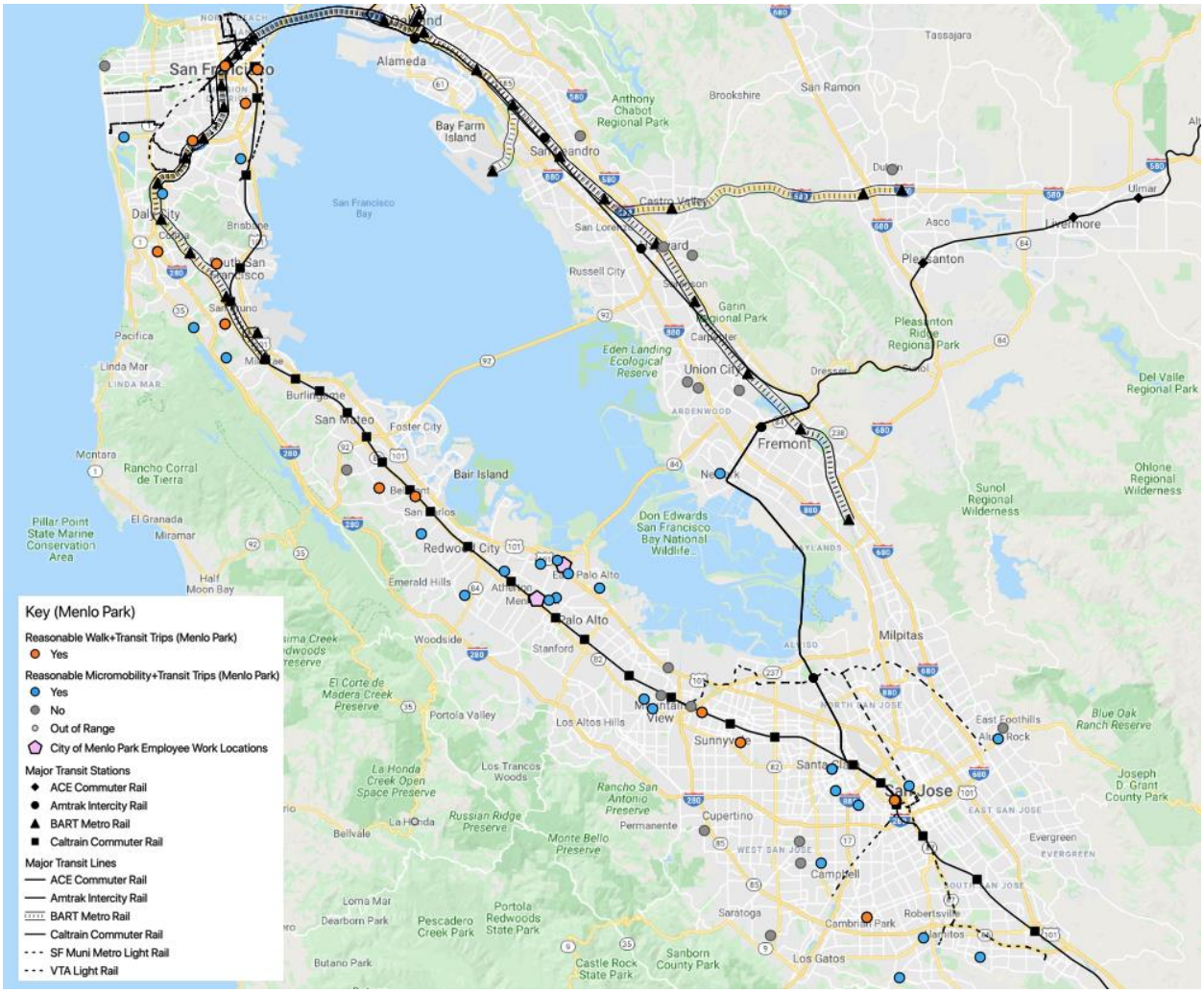
This section presents results for City of Menlo Park employees. Table 4 shows the comparison between walk-to-transit, drive-to-transit, and micromobility-to-transit modes for employees and Map 9 displays the geographic distribution of employees with reasonable walk-to-transit and micromobility-to-transit commutes.

Table 4. City of Menlo Park Employee Transit Trip Opportunities by First/Last Mile Mode

	Percent of Employees by Mode to/from Transit		
Reasonable Trip?	**Walk-to-Transit**	**Drive-to-Transit**	**Micromobility-to-Transit (at least one mode)**
Yes	21 (%)	40 (%)	64 (%)
No	47	52	27
Out of Range	33	8	8

Compared to the overall results, a higher proportion of City of Menlo Park employees have reasonable walk-to-transit, drive-to-transit, and micromobility-to-transit trips, especially for drive-to-transit trips.

Map 9. City of Menlo Park Employees with Reasonable Micromobility-to-Transit Commutes



First/Last Mile Modes by Employer: City of Mountain View

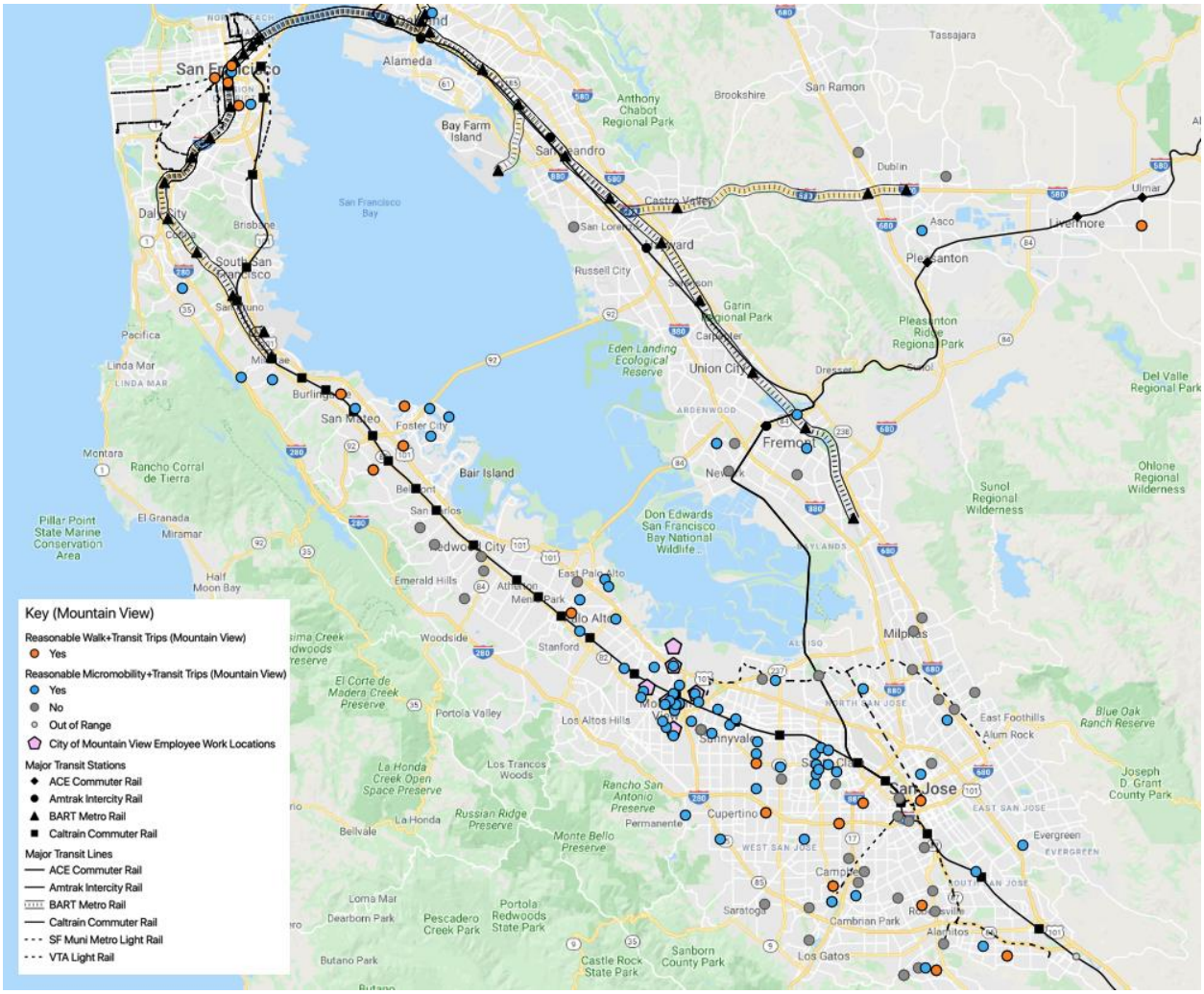
This section presents results for City of Mountain View employees. Table 5 shows the comparison between walk-to-transit, drive-to-transit, and micromobility-to-transit modes for employees and Map 10 displays the geographic distribution of employees with reasonable walk-to-transit and micromobility-to-transit commutes.

Table 5. City of Mountain View Employee Transit Trip Opportunities by First/Last Mile Mode

	Percent of Employees by Mode to/from Transit		
Reasonable Trip?	**Walk-to-Transit**	**Drive-to-Transit**	**Micromobility-to-Transit (at least one mode)**
Yes	16 (%)	21 (%)	61 (%)
No	64	71	32
Out of Range	20	8	8

Compared to the overall results, about the same proportion of City of Mountain View employees have reasonable walk-to-transit and micromobility-to-transit trips and about 5% fewer employees have reasonable drive-to-transit trips.

Map 10. City of Mountain View Employees with Reasonable Micromobility-to-Transit Commutes



First/Last Mile Modes by Employer: City of Cupertino

This section presents results for City of Cupertino employees. Table 6 shows the comparison between walk-to-transit, drive-to-transit, and micromobility-to-transit modes for employees and Map 11 displays the geographic distribution of employees with reasonable walk-to-transit and micromobility-to-transit commutes.

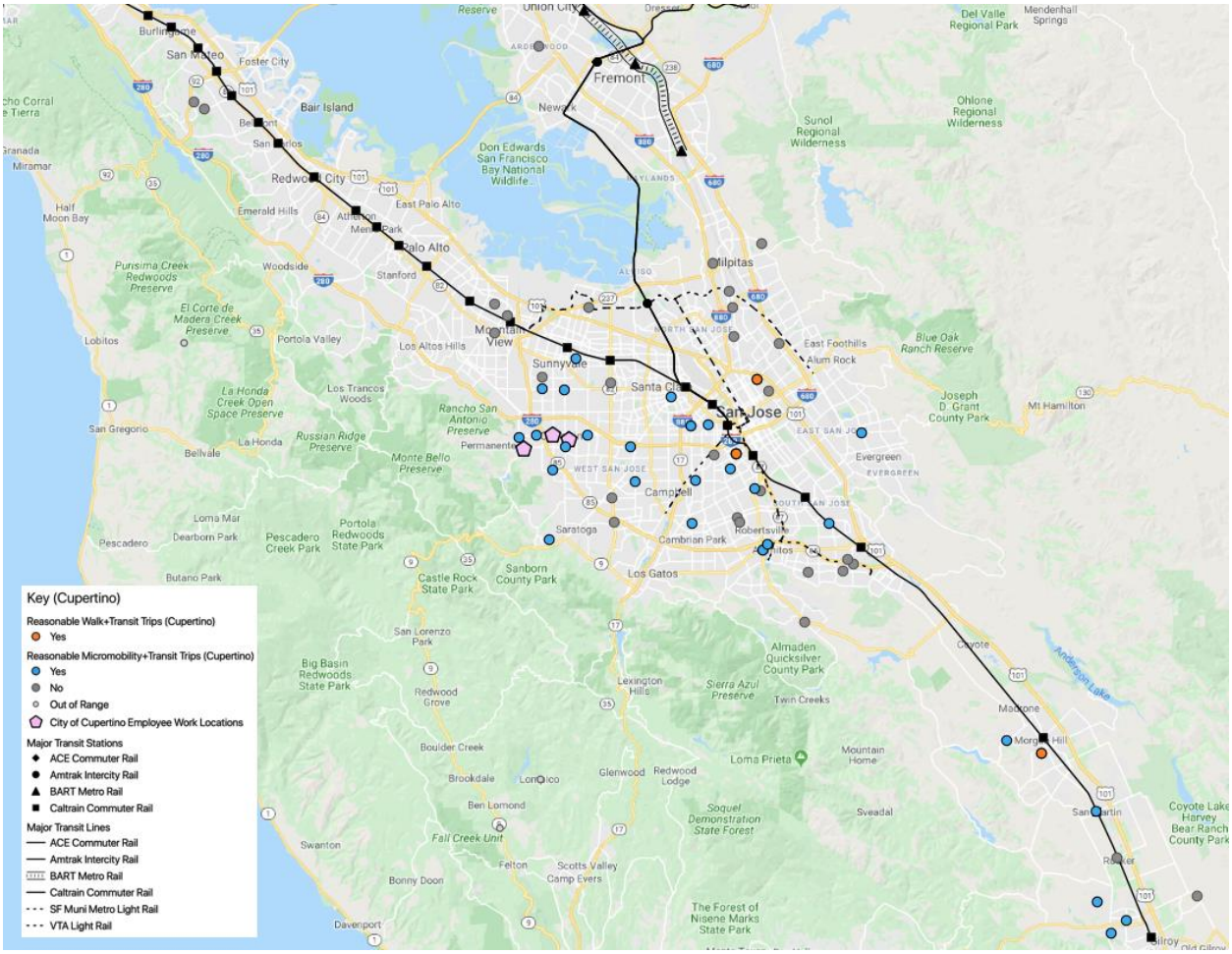
Table 6. City of Cupertino Employee Transit Trip Opportunities by First/Last Mile Mode

	Percent of Employees by Mode to/from Transit		
Reasonable Trip?	**Walk-to-Transit**	**Drive-to-Transit**	**Micromobility-to-Transit (at least one mode)**
Yes	6 (%)	10 (%)	45 (%)
No	76	79	48
Out of Range	18	11	7

Compared to the overall results, far fewer City of Cupertino employees have reasonable walk-to-transit (9% less), drive-to-transit (16% less), and micromobility-to-transit (13% less) trips. This is primarily explained by uncompetitive travel times resulting from a very long last-mile distance from the nearest Caltrain commuter station, 4.5 miles that tested the total range limits of the micromobility modes and/or required additional transfers to local transit, which could include long transfer distances and long transfer wait times. However, the increase afforded by micromobility is just as dramatic as in the overall results.

In October 2019, the City of Cupertino began an 18-month long pilot program to offer an on-demand, flexible route shuttle service to service the majority of the City and to connect to the Sunnyvale Caltrain station.[3] While results are not yet available, it indicates the City is actively testing options to address this substantial last-mile gap.

Map 11. City of Cupertino Employees with Reasonable Micromobility-to-Transit Commutes



[3] For more information about the Cupertino shuttle pilot, see: https://www.cupertino.org/our-city/departments/public-works/transportation-mobility/community-shuttle

Direct-to-Work Micromobility Opportunities

ProspectSV and Interline also generated and evaluated trip itineraries for direct-to-work trips for walking and for using the same set of micromobility modes analyzed earlier (bike, e-bike, e-scooter, bikeshare, e-bikeshare, and e-scootershare) without connecting to transit. This was done to understand the role of micromobility as a potential competitor to transit with shorter commute distances, where faster and longer-distance micromobility modes could compare favorably against infrequent local transit service.

Table 7 below displays the percentage of employees who were determined to have reasonable direct-to-work trips ("Yes"), non-competitive itineraries ("No"), or who live beyond the range of walking or any micromobility modes ("Out of range"). The same criteria were used to compare against driving (twice the driving time and cost equal or less). Specifically, Table 7 contains a comparison between walk-to-transit trips and micromobility-to-transit trips as a group. Micromobility is counted "Yes" if an employee has at least one reasonable trip out of the six micromobility modes analyzed.

Table 7. Comparison of Direct-to-Work Trip Opportunities by Mode

	Percent of Employees by Mode to/from Work	
Reasonable Trip?	**Walk**	**Micromobility (at least one mode)**
Yes	0 (%)	26 (%)
No	4	6
Out of Range	96	68

Based on the assumptions used for this analysis, very few employees live within walking distance from work, and of the 4% who do, none of them would have competitive itineraries compared to driving. When micromobility modes are added, however, the proportion of employees with reasonable trips increases dramatically to 26%.

Looking back to Table 1, 58% of employees have reasonable micromobility-to-transit trips and 42% of employees have unreasonable or out-of-range micromobility-to-transit trip itineraries. Table 8 shows a further breakdown of the 58% into two components. One is employees who could have both direct-to-work micromobility trips and micromobility-to-transit trips. These employees would have a choice, indicating potential competition with transit. The other component is employees who don't have reasonable direct-to-work micromobility trips but who do have reasonable micromobility-to-transit trips.

Table 8. Comparison of Direct-to-Work and Micromobility Transit Trip Opportunities

Trip Types	**Percent of Employees**
Reasonable Direct-to-Work and Micromobility-to-Transit	22 (%)
Reasonable Micromobility-to-Transit Only	36
Unreasonable Micromobility-to-Transit or Out of Range	42

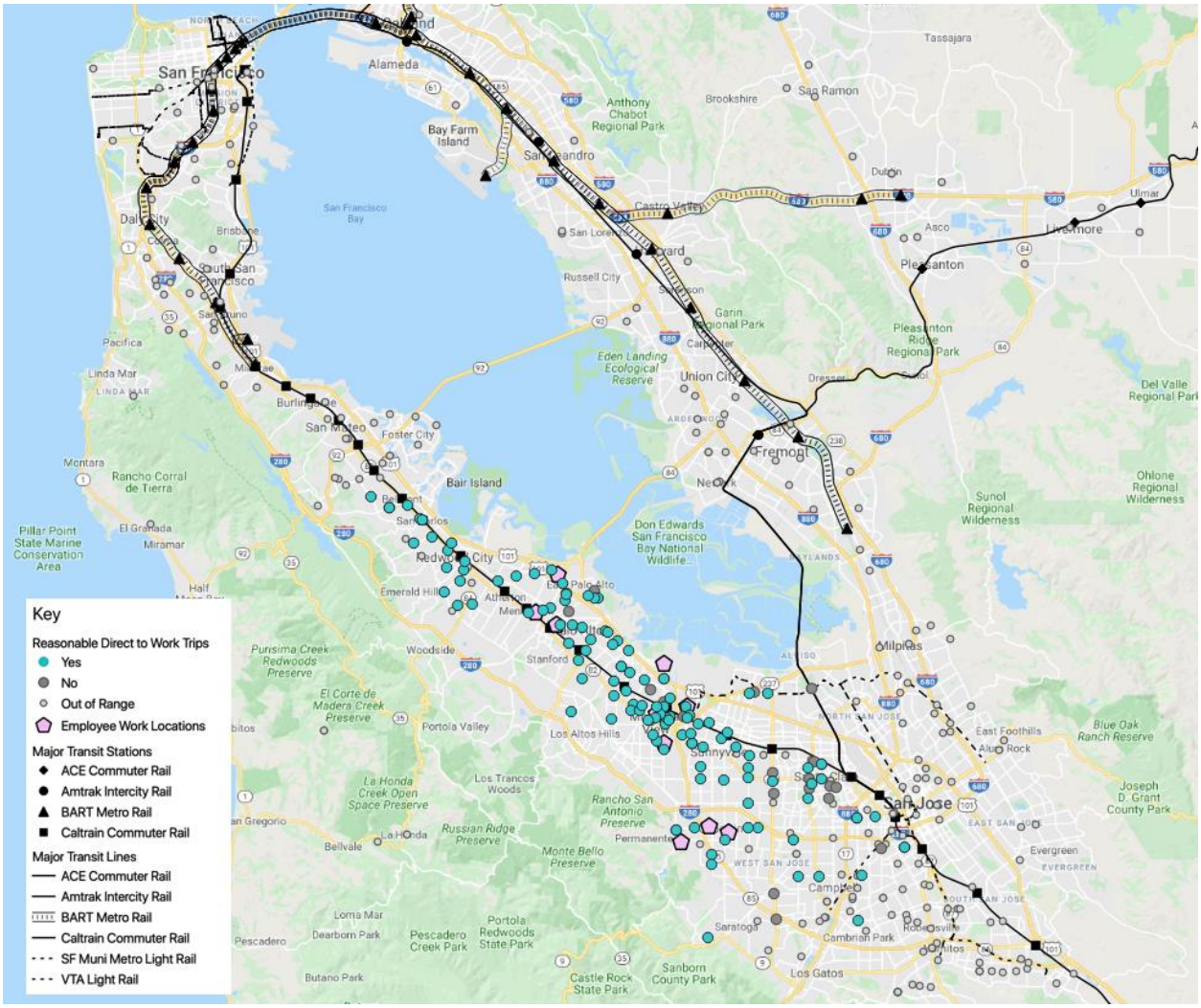
Table 8 indicates that 22% of all employees could use micromobility to commute directly to work as opposed to using transit. This analysis does not predict how many employers would choose

one over the other, but this potentially diminishes the proportion of employees who would use micromobility to commute using transit. However, having a choice between multiple, reasonable non-driving options is generally a positive factor in the alternative commute realm. Given personal preferences between decision-making factors such as weather, cost, convenience, reliability, etc., it is doubtful that employees would all choose the same option over the other.

Additionally, this analysis demonstrates that an additional 36% of all employees would have reasonable micromobility-to-transit trips. Looking back again to Table 1, compared to those who could walk-to-transit (15%), or even drive-to-transit (26%), micromobility-to-transit still indicates a dramatic increase in potential transit trips.

Map 12 displays the geographic distribution of employees with reasonable direct-to-work micromobility commutes. The direct-to-work trips are limited to areas around the employee work locations, and there is no overlap with micromobility-to-transit trips that start further away.

Map 12. Reasonable Direct-to-Work Micromobility Commutes



Opportunities for Drive-Alone Employees

As stated previously, the gap analysis does not predict employees' actual choice of commute mode, rather it is focused on identifying the potential opportunity. However, in an effort to understand how these results relate to employees' current choice of commute mode, ProspectSV analyzed each employee's survey responses to categorize each employee's primary commute mode. Doing this allowed the team to compare the analysis results to just employees who drive alone, which is a more specific mode-shifting opportunity than employees who already commute using alternatives modes (transit, vanpool, carpool, non-driving modes).

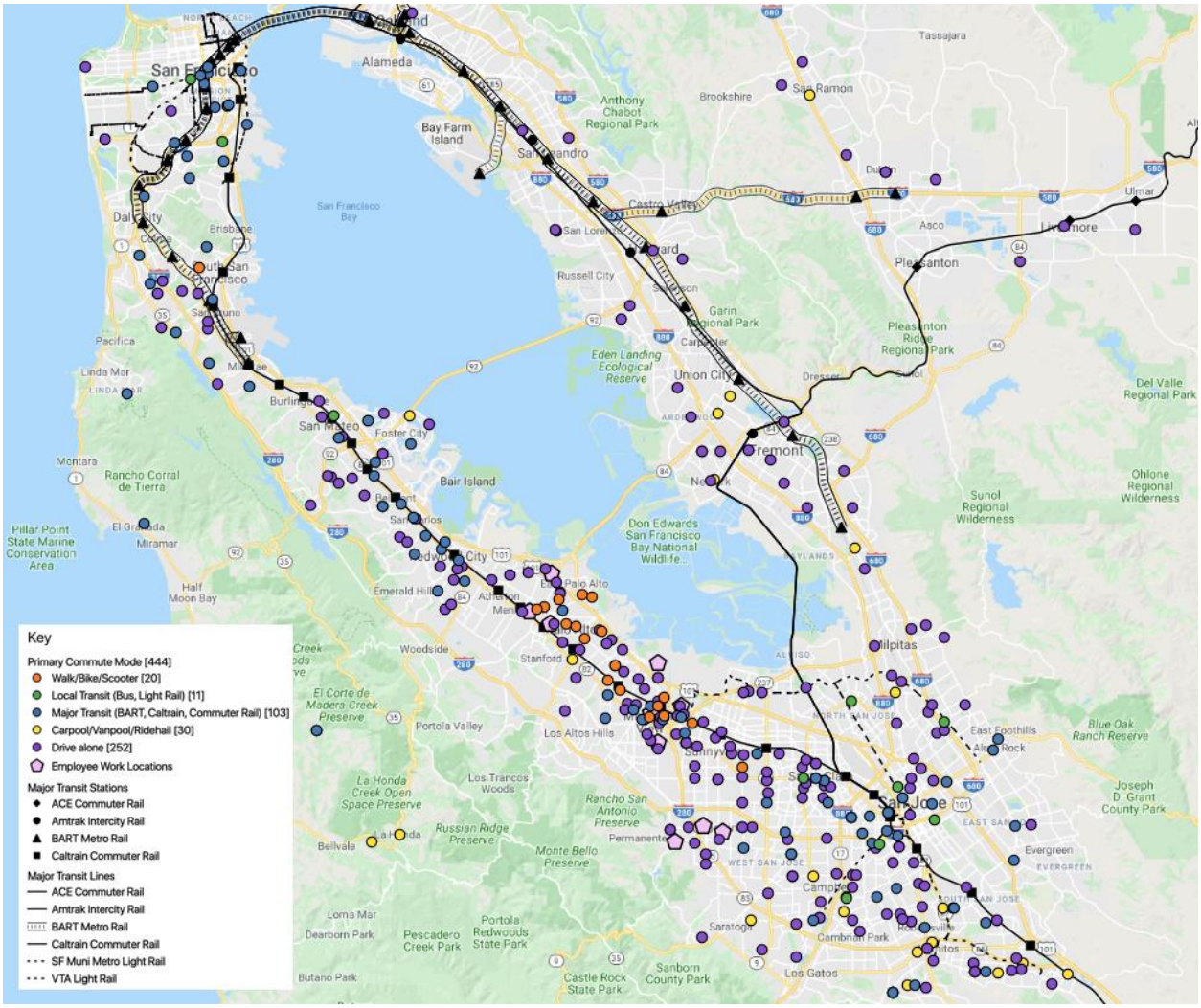
First, ProspectSV evaluated each employee's survey responses[4] to categorize their commute into one of the following primary commute modes: 1. Walk/Bike/Scooter, 2. Local Transit (Bus, Light Rail), 3. Major Transit (BART, Caltrain, Amtrak), 4. Carpool/Vanpool/Ridehail, 5. Drive Alone. Table 9 shows the mode split based on the categorization. Map 13 displays the results of the categorization, coding each home origin by the primary commute mode.

Table 9. Primary Commute Mode

Primary Mode	Percent of Employees
Walk/bike/e-scooter/etc.	5 (%)
Local transit (e.g., bus, light rail)	3
Major transit (e.g., BART, Caltrain, Amtrak)	25
Carpool/vanpool/ridehail	7
Drive alone	61

[4] Some 416 of the 444 employees, or 96%, reported enough information to make this determination, therefore the remaining calculations are based on the 416 employees. However, because of the high percentage of responses, we believe these results can be compared with the other results reported throughout this memo.

Map 13. Employee Primary Commute Modes



In Map 13, employees from San Francisco mostly use transit to commute, likely due to the availability and convenience of transit, while San Mateo County employees are split between Caltrain commuters and those who drive alone, with very few who walk or bike. The majority of employees from North Santa Clara County drive alone, although there are a high number who take transit (both major and local) and a select few who walk or bike in the downtown areas. Interestingly, employees from South Santa Clara County are split almost evenly among drive alone, carpool, and transit modes. All employees from Santa Cruz County drive alone, possibly due to the lack of transit infrastructure to access the Peninsula and South Bay. Similarly, employees from Alameda and Contra Costa counties mostly drive alone, although a few carpool or take commuter rail.

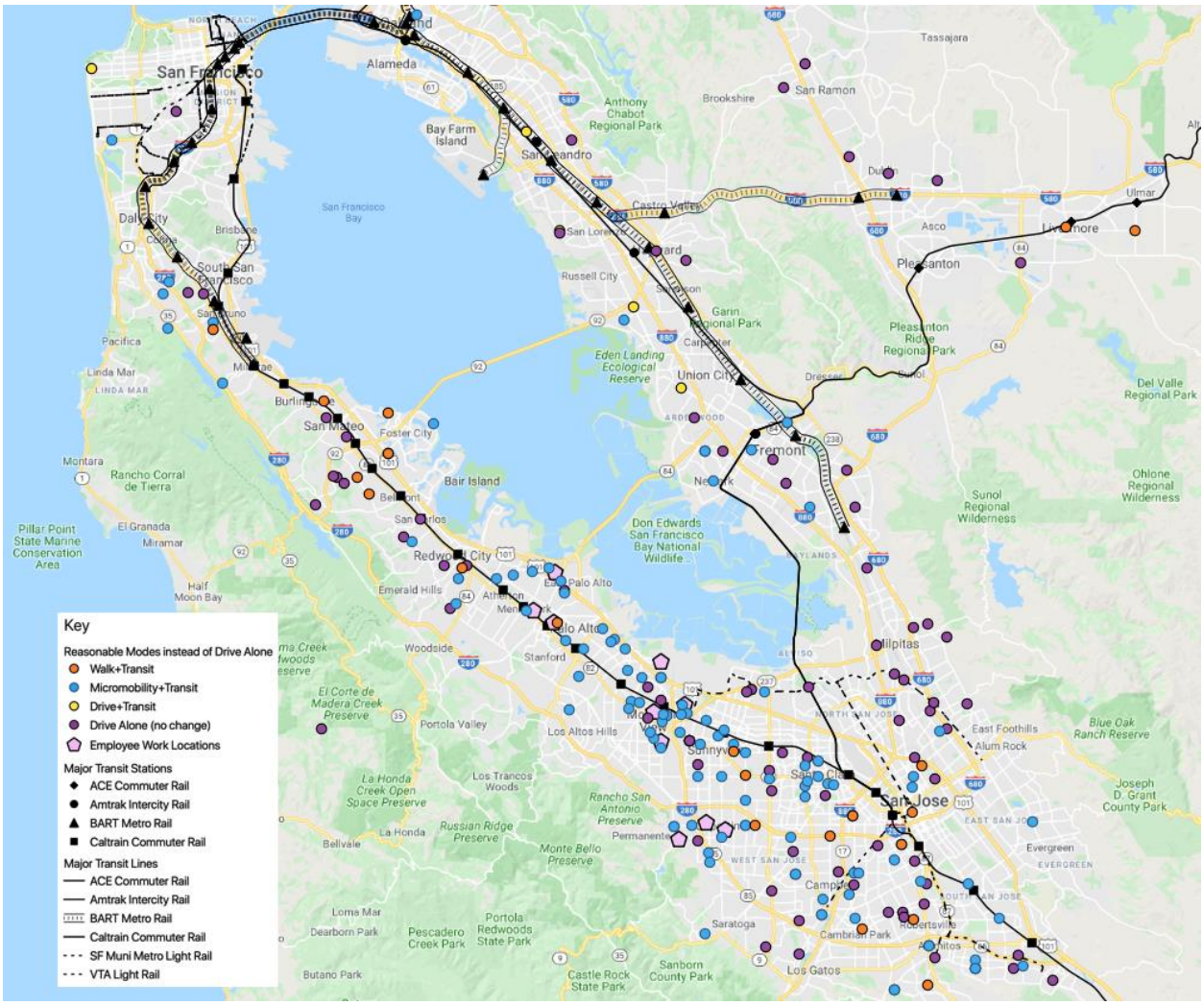
ProspectSV then compared how many of the employees who drive alone could possibly walk, take micromobility, or drive to transit and have a reasonable commute. Table 10 provides the resulting breakdown and Map 14 shows the results spatially.

Table 10. Opportunities by Mode for Drive-Alone Employees

Employees who could switch from driving alone to:	**Percent**	**Percent**
Walk-to-transit	6 (%)	
Micromobility-to-transit	26	
Drive-to-transit	2	
Subtotal		34
Employees who drive alone but would not have a reasonable alternative		27
Employees who already commute using a non-drive-alone mode		39

Of the 61% of employees who drive alone now, more than half of them (34% of all employees) could potentially switch to a reasonable commute by transit. Micromobility-to-transit would enable reasonable trips for the highest percentage of employees by far, echoing the earlier, more general results.

Map 14. Opportunities for Drive-Alone Commuters



Areas for Further Investigation

This gap filling analysis offers observations and conclusions based on the assumptions and methods used, which are appropriate for this high-level analysis. However, alternate assumptions or thresholds could be tested, which would likely alter the magnitude of the results. Below are some areas that could warrant further investigation:

1. Competitiveness of transit travel time: Travel time competitiveness was assumed to be twice that of driving, which is a general industry rule of thumb derived from national average commute travel times. Here is one example summary: https://www.governing.com/topics/transportation-infrastructure/gov-transit-driving-times.html. However, more robust analysis could include use of the Bay Area's regional travel demand model and/or conducting additional surveys to understand employees' specific decision-making thresholds, which were beyond the scope of this study.

2. Range assumptions for micromobility modes: There was scant data found to inform the distances that commuters are willing to travel on the different micromobility modes. The data or guidance we found either did not distinguish between micromobility modes, individual-use vs. shared usage, or trip purpose (commute vs. non-commute). More definitive data with breakdowns covering all of these factors would provide more confidence in the results.

3. Docked vs. dockless shared micromobility modes: This analysis did not differentiate between docked vs. dockless shared micromobility modes. Docked micromobility requires a user to check out a vehicle from a stationary dock and return it to another dock. A dockless, or free-floating shared system, allows a user to check out a vehicle from wherever the vehicle is available, and to leave the vehicle where it is at the end of the trip, using software to manage the checking in/out process. As a hypothetical analysis, the range and cost assumptions were used to differentiate between shared modes, and it was out of scope to hypothetically generate spatial placements of dock locations or fleets of dockless vehicle locations.

4. Cost competitiveness for shared micromobility modes: The primary differentiators between the individual-use and shared micromobilty modes was cost. Bay Area Bike Share offers monthly or annual subscriptions at much lower rates, while other commercial fleets currently do not. A lower assumed cost for shared micromobility could be tested for an increase in the competitiveness of the shared micromobility trip itineraries.

5. Cost competitiveness for individual use micromobility modes: The analysis of individual-use modes did not consider vehicle capital cost, only operational cost. This is in parity with the cost assumption that was used for driving, as most people consider the capital cost of their car to be a sunk cost and they usually consider only operational cost (and sometimes car owners only consider the cost of fuel, which is but one component of operational cost). However, people's perception or expectation of capital cost for micromobility as a commute mode may be different than car ownership. For example, people might calculate the payback period for purchasing an e-scooter against the

cost of renting a shared e-scooter. The analysis could be tested for different individual-use micromobility costs.

6. Parking costs: Analysis in other communities could include parking costs. While parking at all of the four pilot partner worksites is free, for other employers that do charge for parking, the cost of parking could impact the competitiveness of other modes. Similarly, parking costs at transit stations could negatively impact the competitiveness of drive-to-transit itineraries.

4. Recommendations

The analysis points to the high potential for employees to have reasonable commutes to work using micromobility modes for first/last mile connections to transit. Stakeholders are recommended to advocate for, incent, or provide gap-filling micromobility solutions; and to expand the provision of infrastructure to support safe travel by micromobility modes.

A. Advocate for Micromobility Solutions: Public and private employers should advocate for policies that allow the use of micromobility vehicles by their employees. For example, some government agencies have banned electric-powered micromobility vehicles from operating on multi-use trails. Other agencies, particularly municipalities reacting to the wave of new e-scootershare systems being deployed without warning, have banned shared micromobility outright on city streets and sidewalks. Employers can work with government agencies to find solutions to these types of barriers. In the first example, employers could work with park districts to initiate trials or pilots to test responsible use of micromobility modes on trails. In the other example, employers could advocate for instituting municipal permitting processes that allow shared micromobility systems to be deployed responsibly and safely.

B. Incent the Use of Micromobility Solutions: In locales where micromobility is allowed, employers could provide incentives, subsidies, or reimbursements to encourage their employees to try micromobility solutions, invest in them, and/or use them more often. The employers participating in the Fair Value Commuting Demonstration Project have deployed a variety of behavior change programs and monetary incentives to shift employees toward micromobility and transit. Some examples include: pre-tax and post-tax paycheck deferral programs; social media contests; prize drawings and challenges administered through behavior change software platforms; monetary incentives awarded on a periodic basis ranging from per-trip to a monthly basis; reimbursements for expenses such as helmets, high-visibility clothing, bike accessories, etc.; and negotiated micromobility-related discounts at local retailers. Employers could also provide free or subsidized memberships to shared micromobility systems.

C. Provide Micromobility Solutions: Employers may consider providing their own individual-use or shared micromobility solutions for their employees. In the Fair Value Commuting Demonstration Project, several employers have invested in e-scooters and e-bikes to loan them to employees on a temporary basis (such as 2 weeks at a time) as a "try before you buy" program so that employees can become familiar with the vehicle and try out their

specific commute a few times before purchasing their own vehicle. Other employers offer similar programs on a longer-term basis, and have tested "ride to own" programs. Some larger employers maintain their own free shared mobility fleets for on- and off-campus transportation, providing employees with means to travel locally without a car. Many employers also offer support facilities and services including secure parking, showers and lockers, and subsidized on-site micromobility vehicle maintenance and repair services.

D. **Expand Infrastructure to Support Micromobility Safety:** Employers could advocate, support, or help fund efforts that create street networks that are safe for micromobility, such as creating protected cycle tracks, bicycle boulevards, and dedicated multi-use paths. Employers could participate in local government efforts to update bicycle and pedestrian plans, advocating for routes that would benefit their employees. Employers could also work with local government to support infrastructure improvement projects by paying for their design or construction.

Recommendations by Stakeholder Type

The findings and recommendations from this gap analysis apply to many types of stakeholders, and they relate to stakeholders differently. Here are some suggestions for how different stakeholder groups may apply the recommendations.

- **Transit Agencies:** There is high potential benefit to increase transit ridership by encouraging the use of micromobility modes to access transit. Transit agencies have a unique role in enabling micromobility access and managing micromobility parking at transit stations, and facilitating transportation of micromobility vehicles on transit vehicles (recommendation C). Transit agencies may also directly incentivize or subsidize the general public and their employees to use micromobility to access transit (B). Secondarily, they may also advocate with their municipal partners for enabling policies (A) and local micromobility route planning to access transit (D).

- **Municipal Governments:** In California, municipal governments have strong local policymaking powers and power to plan, develop, and control the use of local street infrastructure. Municipal governments are the starting point for policies that enable micromobility vehicles to be used on city streets (recommendation A), and set land use policy that may significantly affect other employers to incent or provide micromobility solutions (B, C). They are also essential for leading the planning and design of city streets and routes that can create safer environments for micromobility users (D). In this leadership role they may include transit agencies, other public agencies, and private employers as part of the local decision-making process. Secondarily, as employers, municipal governments have the ability to set an example for other employers (B, C). In California, municipal governments, along with other public agencies such as transit agencies, are also responsible for achieving state-designated emissions reduction goals. While the findings in this memo do not predict change in commute behavior, it addresses the potential of emissions reduction through the switch from driving alone to alternative modes. Municipal governments and other relevant public agencies may use the

potential emissions reduction as one of the justifications for promoting micromobility modes through policymaking (A).

- **Employers:** Employers (both public and private) have decision-making power for what commute options they support, or don't support, for their employees. For example, providing free parking to employees is a form of subsidy that implicitly encourages driving to work. Employers could choose to offer alternative commute incentives (recommendation B), or subsidize or provide mobility services (recommendation C) that could, at minimum, provide equivalent commute benefits for employees who choose to not drive. Employers also play an important role in advocating for policies that benefit their employees (and often benefit the local community at the same time)(recommendation A) and could directly or indirectly support infrastructure (recommendation D). For example, an employer could fund a mobility study that is carried out by the municipality. Or an employer could pay for the design and construction of street safety improvements according to the city's standards and approval.

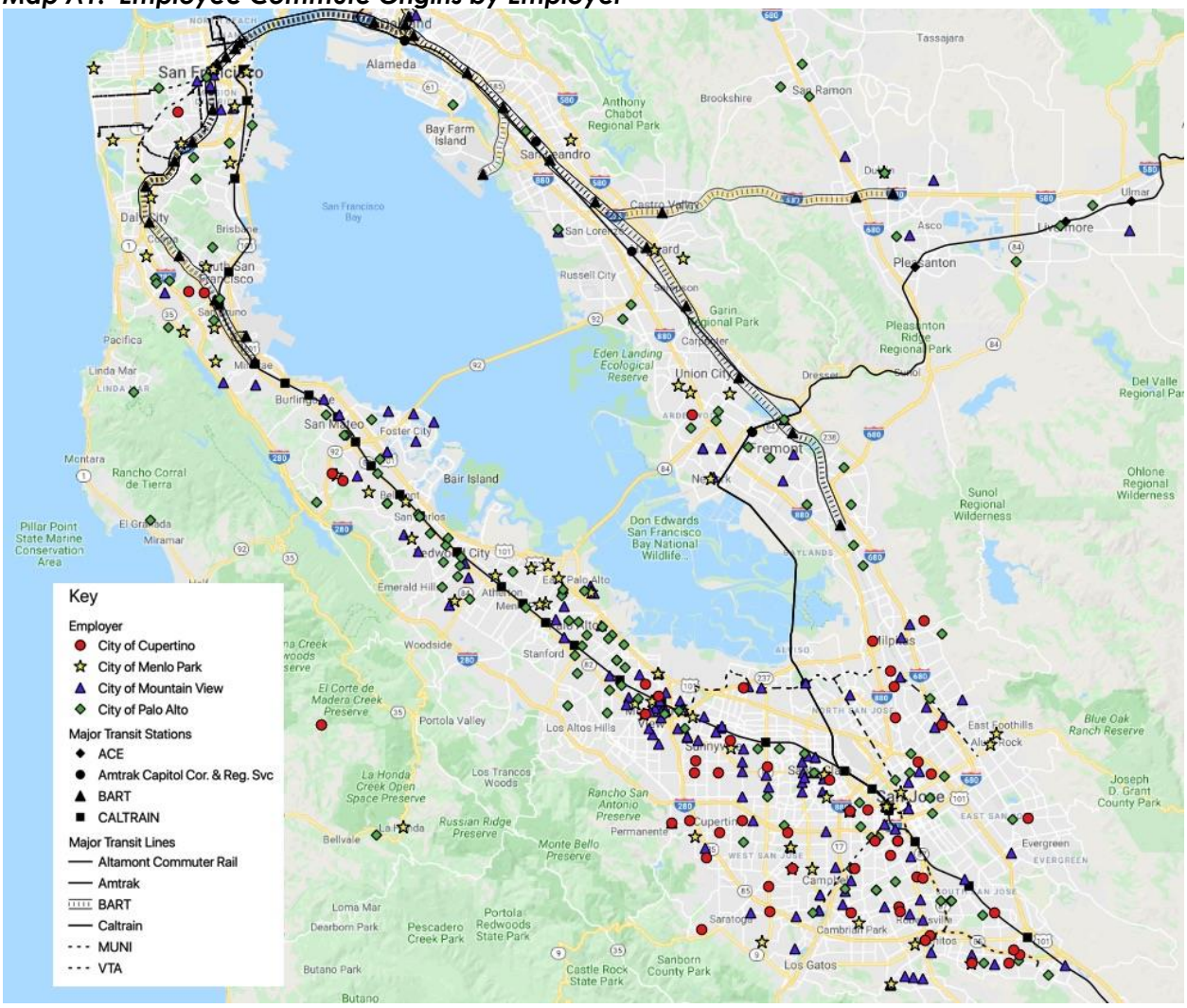
- **Micromobility solution providers:** The primary role of micromobility solution providers is to make available the micromobility vehicles and support systems that would allow employees to commute reasonably using micromobility (recommendation C). This could be done in coordination with individual employers, as a publicly-available shared fleet, or marketing to consumers. Reasonable, as defined in this gap analysis, includes competitive travel time and cost. While travel time benefits are clearly demonstrated in this analysis, the cost for shared systems in particular has a significant limiting effect when compared to the cost of driving and the cost of individual-use modes. Apart from that primary role, micromobility solution providers have a vested interest in creating an environment that allows the legal use of their solutions on city streets (recommendation A), and creating a safe operational environment for commuters (recommendation D). Micromobility solution providers could actively participate in community planning efforts and coordinate with municipal government to develop policies and permit processes that benefit all road users and address community concerns of micromobility solutions. They may also coordinate with local transit agencies to facilitate the use and accommodation of micromobility solutions at stations and on vehicles. They could also coordinate or participate in employer campaigns to help lower the cost of micromobility solutions (recommendation B).

Appendix A: Employee Commute Origins

Map A1 illustrates the origin (home) location of employees, differentiated by employer. The distribution of all employees (total 444) spans six of the nine San Francisco Bay Area counties, including San Francisco, San Mateo, Santa Cruz, Santa Clara, Contra Costa, and Alameda, with a few outliers beyond the Bay Area in Sacramento and San Joaquin counties. The majority of employees are concentrated in the South Peninsula and North Santa Clara County.

- City of Cupertino employees (total 71): concentrated in north Santa Clara County, approximately within a 10-mile radius of Cupertino City Hall, although a few (10%) live in the south of Santa Clara County.
- City of Mountain View employees (total 160): concentrated in north Santa Clara County, approximately within a 10-mile radius of Mountain View City Hall, although about 30% live in the Counties of San Mateo, Alameda, and Santa Cruz.
- City of Menlo Park employees (total 73): majority distributed somewhat evenly in the Counties of San Francisco, San Mateo, and Santa Clara, with about 20% in Alameda and Contra Costa Counties, and a few outliers in Santa Cruz County.
- City of Palo Alto employees (total 140): majority distributed somewhat evenly in San Mateo and north Santa Clara County, with about 30% in San Francisco and Alameda Counties, and a few outliers in Santa Cruz County.

Map A1. Employee Commute Origins by Employer



Appendix B: Assumptions

This appendix lists the assumptions used for the Gap Analysis.

1. **Itinerary Departure Time**

The trip itineraries assumed a default departure time of 7am for a typical workday commute, unless the survey respondent stated a different departure time. Similarly, the departure time for the evening commute trip from work to home was set to be 5 pm of every weekday, unless otherwise specified by the respondent. The default times were derived from reported departure times, which 94% of respondents provided. Only 6% of respondents did not report a departure time.

2. **Commute Cost**

To calculate the cost of a trip to a commuter, ProspectSV and Interline estimated approximate costs for all potential transport modes to calculate passenger cost estimates for each of the trip itineraries ($ per leg and/or $ per mile), shown in Table B1. Where both costs per leg and per mile are shown, the costs are additive, meaning that both a cost per leg and a cost per mile are assessed to the commuter. A detailed explanation of the cost is located in **Appendix C: Commute Cost Assumptions with Sources.**

Table B1. Costs per Leg and/or per Mile by Mode

Mode Category	Mode Sub-categories	Cost per leg (one-way trip)	Cost per mile
Transit	Commuter Rail (e.g. Caltrain)	$9.37	
	Local Bus (e.g., Samtrans, VTA)	$2.50	
	Express Bus	$5.00	
	Metro Rail (BART)	$3.25	
	Light Rail (VTA, Muni)	$2.50	
	Shuttle	$0.00	
Micromobility	Bike		$0.10
	E-bike		$0.20
	E-scooter		$0.09
	Bikeshare (Bay Wheels)	$2.00	
	E-bikeshare (JUMP)	$3.00	
	E-scootershare (e.g. Lime, Bird, JUMP)	$1.00	$1.50
Other	Walk		$0.00
	Drive		$0.58

3. **Maximum Distance by Mode**

ProspectSV also developed an assumption for the maximum distance a commuter would be willing to travel for each mode, for first/last mile micromobility modes (Table B2) and for direct-to-work trips (Table B3). The distances were set to represent commuters' willingness to use micromobility modes. The maximum distance was also set to limit OpenTripPlanner so that it would generate commutes with meaningful transit legs. For example, in the case of e-bike to transit or drive to transit, where e-bike and drive could be attractive competitors to transit, OpenTripPlanner might assign those modes the vast majority of a commute and only assign a short, nonsensical transit leg (such as taking Caltrain one stop). For the sources used to inform these assumptions, please refer to **Appendix D: Commute Distance Sources.**

Table B2. Maximum Micromobility Distance To and From Transit

Mode	Max Distance (first + last legs combined)	Max Transfer Distance (assume walk)	Total Max Distance (first + transfer + last legs)
Walk	1	0.5	1.5
Bike	2	0.5	2.5
E-bike	5	0.5	5.5
E-scooter	2.5	0.5	3
Bikeshare	2.5	0.5	3
E-scootershare	2	0.5	2.5
Drive to Transit (first leg only)	10	0.5	10.5

Table B3. Maximum Micromobility Distance for Direct-to-Work Trips

Mode	Max Distance (miles)
Walk	1.5
Bike	5
E-bike	10
E-scooter	1.5
Bikeshare	1.5
E-bikeshare	1.5
E-scootershare	1

4. **Assumed Travel Speeds**

Table B4 shows the assumed travel speeds for each micromobility mode.

Table B4. Travel Speeds by Mode

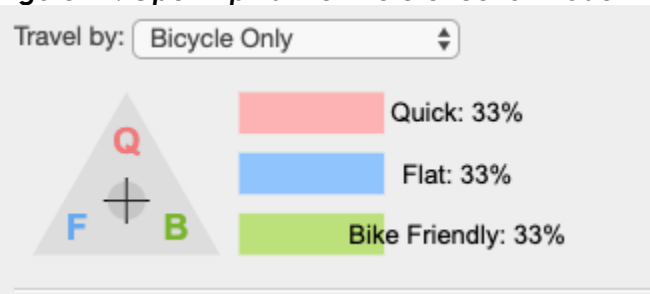
Mode	Assumed Speed (miles per hour)
Bike and Bikeshare	9.2
E-bike	15
E-scooter	10

5. **Prioritization of Bike Route Characteristics**

OpenTripPlanner allows for the user to specify a preferred balance of speed, slope, and safety ("Quick," "Flat," and "Bike Friendly," respectively) for bicycle-related itineraries; see screenshot below. Safety considers a number of factors: dedicated cycle path, vehicle speed, road classification, etc. Prioritizing this side of the "triangle" will instruct OTP to use roads considered safer even if the itineraries result in a longer trip, or higher slopes. For this analysis, the ratio was set to 60% for safety, 20% for speed, and 20% for slope to be more inclusive of mainstream commuters (to borrow from Portland, Oregon, these could be called "Interested but Concerned") who are more sensitive to road safety compared to more experienced commuters

("Strong & Fearless" and "Enthused & Confident").[5] Also, we assumed that greater availability of electric-powered micromobility vehicles would de-emphasize speed or slope.

Figure B1. OpenTripPlanner Preference for Mode



[5] For a brief explanation, see Portland DOT article on "Four Types of Transportation Cyclists," https://www.portlandoregon.gov/transportation/article/158497.

Appendix C: Commute Cost Assumptions with Sources

This appendix contains notes and sources for the commute cost assumptions described above.

Mode	Price per leg	Price per mile	Notes	Source
Commuter Rail (e.g. Caltrain)	$9.37		Based on a 3-4 Zone trip, typical adult fare	http://www.caltrain.com/Fares/farechart.html
Local Bus (e.g. Samtrans, VTA)	$2.50		Typical adult fare	https://www.vta.org/go/fares
Express Bus	$5.00		Typical adult fare	https://www.vta.org/go/fares#tab-adult-express
Metro Rail (BART)	$3.25		Typical leg, e.g. from Daly City to Embarcadero (9 stops)	https://www.bart.gov/tickets/calculator
Light Rail (VTA, Muni)	$2.50		Typical adult fare	https://www.vta.org/go/fares
Shuttle	$0.00		Many shuttles from transit stations are free (ex. shuttles from the Caltrain, ACE stations)	http://www.caltrain.com/schedules/Shuttles.html
Bike		$0.10	Kiplinger: "Our estimate of the per-mile cost of biking is 10 cents and includes maintenance and depreciation, based on interviews with U.S. cycling organizations and previously published research."	https://www.kiplinger.com/tool/spending/T061-S001-how-much-can-i-save-biking-to-work/index.php
E-bike		$0.20	Difficult to determine the exact cost per mile, due to many factors at play (cost of bike itself, cost to charge the battery, etc). But the average range of cost per mile is between 5-20 cents, according to various articles/e-bike forums.	https://www.bloomfieldbike.com/articles/buyers-guide-to-electric-bicycles-pg72.htm https://electricbikereview.com/forum/threads/doing-the-math-cost-per-mile-more-range-please.4519/
E-Scooter		$0.09	Cost to own, operate, and maintain an e-scooter	https://electricscootering.com/electric-scooter-cost/
Bikeshare (Bay Wheels)	$2.00		Bay Wheels includes both bikeshare and e-bike share, does not differentiate prices. $2 for one ride up to 30 minutes, $3 per additional 15 minutes. Average of 4 min per mile = 80 cents. Monthly pass option available but not assumed.	https://help.baywheels.com/hc/en-us/articles/360029362511-Usage-Fees
E-bikeshare (JUMP)	$3.00		Ex. JUMP Bikes: Unlock fee is $3 and includes first 20 min ($.15 per min after that). Average of 4 min per mile = 60 cents per mile after 5 miles	https://www.jump.com/us/en/cities/san-francisco/
E-Scooter Share (e.g. Lime, Bird, JUMP)	$1.00	$1.50	Ex. Lime - $1.00 to unlock, plus 27 cents per minute, ~6 mins per mile. Cost per mile: $1.62 Ex. Bird - $1.00 to unlock, plus 15 cents per minute, ~6 mins per mile. Cost per mile: $.90 Ex. JUMP - Free to Unlock and $.33 per min. ~6 mins per mile. Cost per mile: $1.98	Based on the Lime, Bird and JUMP apps, in San Jose and San Francisco
Walk		$0.00	Time cost not included	
Drive		$0.58	"The per-mile cost of driving to work is 58 cents, including gasoline, insurance, maintenance and depreciation, according to the IRS' 2019 standard mileage rates."	https://www.irs.gov/tax-professionals/standard-mileage-rates

Appendix D: Commute Distance Sources

This appendix contains sources for micromobility modes that were used to inform the maximum distance assumptions in the Gap Analysis. Notably, sources listed general or average distances, and scant information was found on maximum distances, as well as for bikeshare and e-bikeshare, and e-scootershare systems.

Mode	Average Commute Distance	Source
Walk	0.3 miles	2012 National Household Travel Survey (NHTS): https://www.nrel.gov/transportation/secure-transportation-data/assets/pdfs/calif_household_travel_survey.pdf
Walk	2 miles	Commute Seattle: https://commuteseattle.com/wp-content/uploads/2018/02/2017-Commuter-Mode-Split-Survey-Report.pdf
Bike	1.5 miles	2012 California Household Travel Survey: https://www.nrel.gov/transportation/secure-transportation-data/assets/pdfs/calif_household_travel_survey.pdf
Bike	6.1 miles	Commute Seattle: https://commuteseattle.com/wp-content/uploads/2018/02/2017-Commuter-Mode-Split-Survey-Report.pdf
Bike	5.27 miles	SANDAG "Active Transportation": https://www.sandag.org/uploads/publicationid/publicationid_4549_24879.PDF
Bike to transit (minimum distance)	0.5 miles	National Association of City Transportation Officials
Bike to transit (minimum distance)	1 mile	League of American Bicyclists: https://bikeleague.org/content/federal-data-says-bike-commuting-down
Bike to transit (minimum distance)	1 mile	Transp-TDM listserv
Bike (transit to work)	0.5 miles	SF Bicycle Coalition
E-bike	9.3 miles	TREC: https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?article=1163&context=trec_reports
E-scooter	1.15 miles	Average trip length in Portland https://www.portlandoregon.gov/transportation/article/709719
E-scooter	Less than a mile (upper 0.X miles)	Dr. Kevin Fang: "various reports individual cities have put out on their pilot programs"
Skateboarders/ Human-powered scooters	0.7 miles	2012 California Household Travel Survey
Bikeshare	1+ mile (low 1.X miles)	Dr. Kevin Fang: "various reports individual cities have put out on their pilot programs"

Appendix E: Itinerary Data Fields

The following is a list of the trip itinerary data fields output from the custom scripts developed by Interline as a result of processing the itineraries generated by OpenTripPlanner and Google Maps API:

Input Details:
- od_pair_id: internal identifier for trip
- od_pair_source_table: source table, "to_work" for trips originating at home and ending at work, and "from_work".
- od_pair_source_id: source identifier, from your spreadsheet
- od_pair_start_lat: final geocoding results for origin
- od_pair_start_lon: ""
- od_pair_end_lat: final geocoding results for destination
- od_pair_end_lon: ""
- od_pair_start_time: timestamp, in local time, for routing request. first leg begins at this value + 'initial_wait_time'

Itinerary Summary:
- error: any error generating this itinerary
- params: parameter group, e.g. "walk.json", "ebike+transit.json", specifying travel modes allowed and values such as speed
- rank: the first, second, or third itinerary (beginning at 0)
- travel_time: overall trip travel time (does not include 'initial_wait_time' before starting first leg)
- distance_mi: overall trip distance in miles
- cost_estimate: cost estimate based on rules defined in spreadsheet
- mode_summary: a summary of each leg in the itinerary, separated by "--"

Multimodal Values:
- access_mode: for multimodal trips, the travel mode of the first leg
- access_time: travel time of first leg
- access_distance_mi: travel distance of the first leg
- initial_wait_time: time spent waiting before leaving the origin (e.g. waiting to leave to time catching a train)
- egress_mode: for multimodal trips, the mode of the last leg
- egress_time: travel time of last leg
- egress_distance_mi: travel distance of the last leg
- transit_vehicle_time: total travel time spent in transit vehicles on transit legs
- transfer_distance_mi: total travel distance in transit vehicles
- transfer_count: number of transit vehicle transfers
- transfer_distance_mi: distance walked during transfers between transit legs
- transfer_wait_time: total time spent waiting for a transit transfer (not moving)
- transfer_walk_time: total time spent walking during transfers

Time/Distance Summaries by Mode:
- walk_time: total walking travel time
- walk_distance_mi: total walking travel distance
- bike_time: total bicycle travel time
- bike_distance_mi: total bicycle travel distance
- drive_time: total driving travel time
- drive_distance_mi: total driving travel distance

Park and Ride Specific Fields:
- start_parknride_id: the internal identifier of the park and ride stop nearest the trip origin
- end_parknride_id: the internal id of the park and ride stop nearest the trip destination

APPENDIX

9

PATMA Equity and Accessibility Paper

Social Equity and Accessibility: Low-income Transit Pass Program

Summary of Full Report

For City of Palo Alto's Fair Value Commuting Project

Oct 7, 2019, version. URL: http://bit.ly/FVCequitySummary

by Steve Raney, Sana Ahmed, Kruti Ladani

The full report may be accessed at: http://bit.ly/FVCequity

Executive Summary

Silicon Valley Equity Challenges

The Bay Area, Silicon Valley (defined as San Mateo and Santa Clara Counties), and Palo Alto all face an equity challenge. Some of the major challenges include:

- 30 percent of Silicon Valley residents cannot meet their basic needs without public or informal financial assistance.
- From 2000 to 2015 in the Bay Area, there was a large displacement of African American and Latinx residents from the urban core to the far outer edge of the Bay Area. This displacement increased commute distances. Of the low-income people of color who moved during the period, 30 percent moved entirely out of the Bay Area.
- White Silicon Valley residents earn three times more than Latinx residents.
- From 1925 to 1950 Palo Alto had deed covenants preventing the sale of homes to non-whites.
- Palo Alto has only one-quarter as many Latinx residents as Santa Clara County, six percent versus 24 percent.

Equity-increasing Low-income Transit Pass Program

PATMA is a non-profit with about $500,000 per year in revenue and matching expenses. PATMA's goal is to reduce commute trips by 30%. Downtown Palo Alto service worker SOV commute mode share was initially measured at about 70%, providing PATMA's largest immediate opportunity for trip reduction. Within the U.S. TDM Social Equity Subdiscipline, PATMA is undertaking two unique activities:

- Buying and managing monthly transit passes for more than 240 low-income commuters who work in downtown
- Undertaking door-to-door, in-person outreach to 300 downtown Palo Alto businesses, some with only a handful of workers. This can be characterized as "retail TDM." TDM scales more easily in the service of large employers, whereas PATMA outreach efforts are relatively labor-intensive.

PATMA low-income commuters are service workers at restaurants, hotels, Starbucks, CVS, Verizon Store, etc. The annual household income limit of $70,000 reflects the high regional cost of living (Santa Clara County defines households earning less than $84,000 as low-income).[1] The average cost of transit passes for Caltrain, SamTrans, VTA, and AC Transit (Dumbarton Express) is about $133 per commuter per month. The TMA works first with store managers who disseminate program information to their workers. Once a worker applies for the program, the TMA works directly with them to provide a Clipper transit fare card and then electronically add transit passes to their card every month. 66 out of 300 downtown businesses participate in the program.

Employers and employers find the program effective in addressing economic challenges:

- "Without this program, I wouldn't be able to work here. This is instrumental in helping people have a job out here."
- "Our hardest thing is hiring people. Alleviating an employee's cost of traveling to work by $150/month is like getting a $1/hour raise."
- "Being able to offer potential employees the TMA transit pass gives us a leg up to hire new employees. For some people, it's a deciding point about whether they will work here or not."

In a provided analysis of TDM program cost efficacy, the transit pass program is shown to be relatively cost-effective but is not the most cost-effective program.

[1] Joint Venture Silicon Valley report: Poverty in the Bay Area, March 2015.

Obstacles such as higher need to trip chain (to access multiple jobs) and residential location make transit a more difficult option for service workers than for technology, light office, or government workers. Incremental solutions such as signal synchronization to speed transit will provide some relief.

Non-incremental solutions, such as building more affordable housing closer to jobs, are more difficult to bring about, but offer the hope of larger relief. Equity obstacles are unfortunately increasing for service workers. The PATMA transit pass program provides improved equity within a deteriorating equity situation.

Transit Pass Program Accessibility

PATMA's transit pass program provides monthly transit passes on four public transit operators, each of which is compliant with the Americans with Disabilities Act. The program provides strong accommodations for language and program information accessibility, and for commuters who are underphoned, unphoned, or unbanked.

Low-income commuter profile and their challenges

Downtown Palo Alto is a myriad of businesses and PATMA caters to about 240 commuters at these businesses. Each business is different in its employee operations and needs resulting in a specific commuter profile as explained in the subsequent paragraphs. Identifying the commuter profile helps to design the programs so that it best fulfills the needs of low-income commuters.

For one restaurant:

- Ten staff bike to work from East Palo Alto or Redwood City.
- 70% of staff use Spanish as their primary language.
- Because of the high cost of living, ten staff were priced all the way out of state.
- Tech companies are paying $20/hour for dishwashers, a rate that restaurants have difficulty competing with.

For one healthcare employer:

- There was an evening mugging of a staffer right across the street from the facility.
- Five years ago, the majority of the staff lived in East Palo Alto, but since have been priced out to San Jose and the East Bay.
- Many staffers hold two jobs. Many have days with long hours.
- Some workers buy reduced price half-year on-street permits but complain that permits are only available in parking zones with long walks in the cold of winter at night.

SOV-commuting employees at coffee shops, cellular stores, and drug stores often move their cars every two hours, frequently collecting multiple parking tickets per month. Throughout the day, the walk back from moving cars between colored zones gets longer and longer. While these employees qualify for reduced-price $50 per half-year parking permits, there isn't much uptake. Barriers include:

- Unwillingness to envision six months at the same job
- Difficulty in completing the permit application process, especially for ESL employees
- Lack of availability of permits in convenient, nearby parking zones.

One frustrated bartender collected four parking tickets in a month and contemplated quitting. He knows he needs to move his car within 20 minutes but then he gets slammed with customers for about 45 minutes. When the customer rush lets up he goes to move his car only to find a ticket.
The latest Downtown Palo Alto Commuter Survey was conducted October 2018 through December 2018, the respondents being employees of businesses located within Downtown Palo Alto. The survey was paper and web-based to increase participation from downtown businesses. The unique

part of the survey was that it was provided in Spanish as well as English. The survey results showed downtown SOV trips have decreased while transit trips have increased. Details about the survey instrument, methodology and results of the Downtown Commute Survey can be found in the full report.

Service workers often work odd hours and long shifts, making it more difficult to find good transit options. On weekdays, Figure 1 shows that while the most common start time is 8 AM, workers start as early as 5 AM or even as late as 12 AM. Many of the start times occur outside of normal transit operating hours, creating an obstacle to using transit.

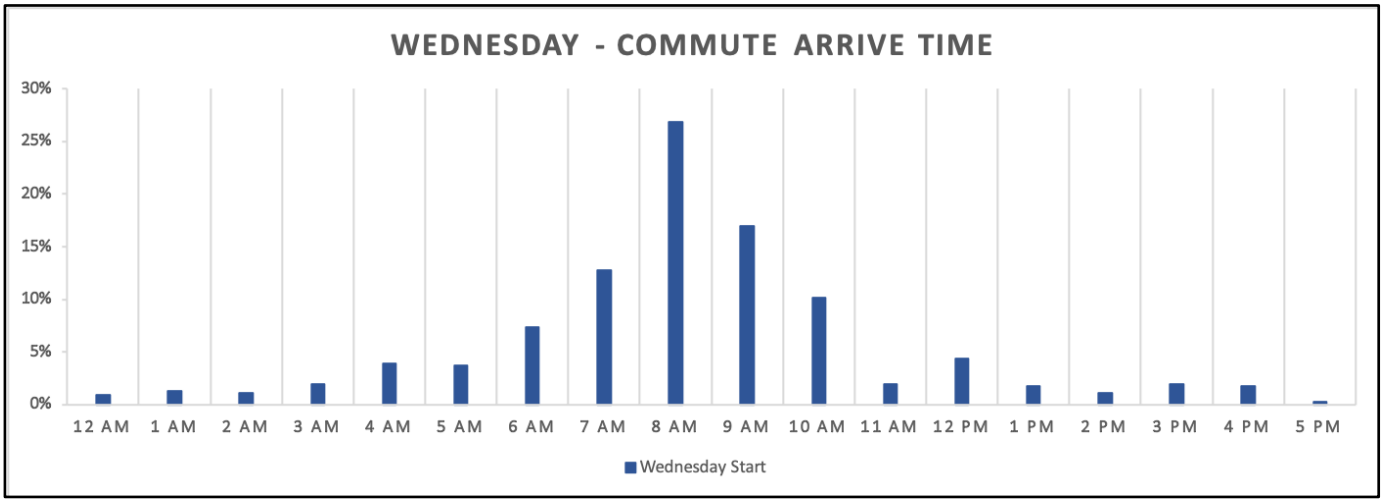


Figure 1

Testimonials from program participants

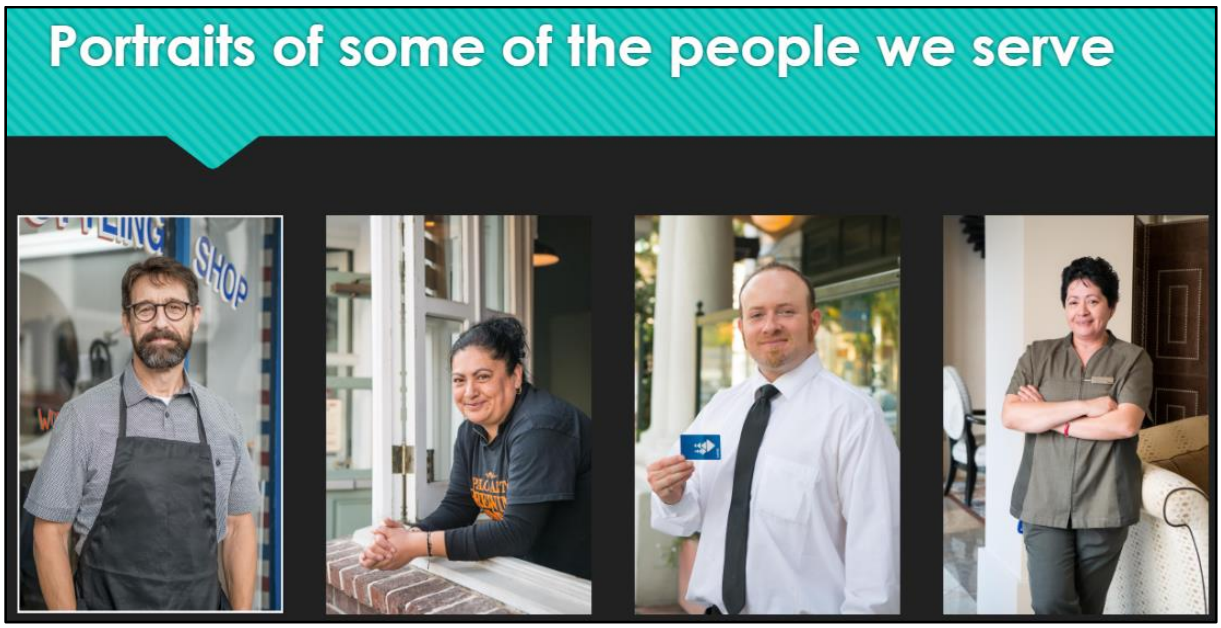


Figure 2

The PATMA transit pass program is changing the lives of low-income commuters and supporting a vibrant downtown by making it easier to recruit staff:

Person & Employer	Testimonial Quote
K, Palo Alto Bicycles	"Our hardest thing is hiring people. Alleviating an employee's cost of traveling to work by $150/month is like getting a $1/hour raise."
R, Il Fornaio	"Being able to offer potential employees the TMA transit pass gives us a leg up to hire new employees. For some people, it's a deciding point about whether they will work here or not."
Manager at Keen	“Without this program, I wouldn’t be able to work here. This is instrumental in helping people have a job out here.”
Manager at MacArthur Park	“I love when my employees take the train because then they’re on time for their shifts. When they drive they’re often late because they’re stuck in traffic.”
M, Sheraton	"I'm thinking of going back to school with the money I save from the TMA's transit pass."
I, Sheraton	"I'm going to go back to school since I’m now saving enough money on my commute."
M, Sheraton	"Taking the VTA bus then Caltrain gets me here faster than driving from San Jose. With the bus and train, I get here in 40 minutes. Driving can take one hour and 45 minutes."
L, The Westin	"The train is much faster than driving."
H, Community Pharmacy	"This allows me to save more money for pharmacy school next year. The Caltrain from Sunnyvale is faster and more relaxing. In the morning it's express to downtown Palo Alto. This pass is like Christmas."
S, Community Pharmacy	I live in Hayward and used to spend $90/month on Dumbarton Bridge tolls. Now I'm much less stressed. It's so relaxing on the bus. I'm very happy and very grateful for this transit pass."
Another Community Pharmacy employee	"I feel bad for people who drive and are stuck in traffic. The train is so much faster."
R, The Taproom	"The Caltrain from San Jose is much faster than driving and I get to relax on the way to work."
K, Il Fornaio	"I get off late at night and the Caltrain whizzes you home. Having another $80/month makes a big difference, like the City is looking out for you. It's also convenient that I only have to tag on and off one trip and then not the rest of the month. That way if I'm running late for the train I can just jump on. That extra minute makes a difference between catching the train or missing it."

Table 1. Commuter/employer testimonials collected by Justine Burt on 11/15/18 and 11/29/18

Figure 3. Selected responses from October 2018 pass renewal emails and text messages

Annual income distribution of program participants

From the PATMA’s transit pass program operational database, a histogram of the annual income of 556 transit program commuters who participated in the program at some point for one or more months is presented below. The median income is $31,200 while the mean income is $31,440. The histogram conveys that the majority of PATMA’s participants lie in the $25,000 to $45,000 range depicting the importance of the transit pass program subsidy.

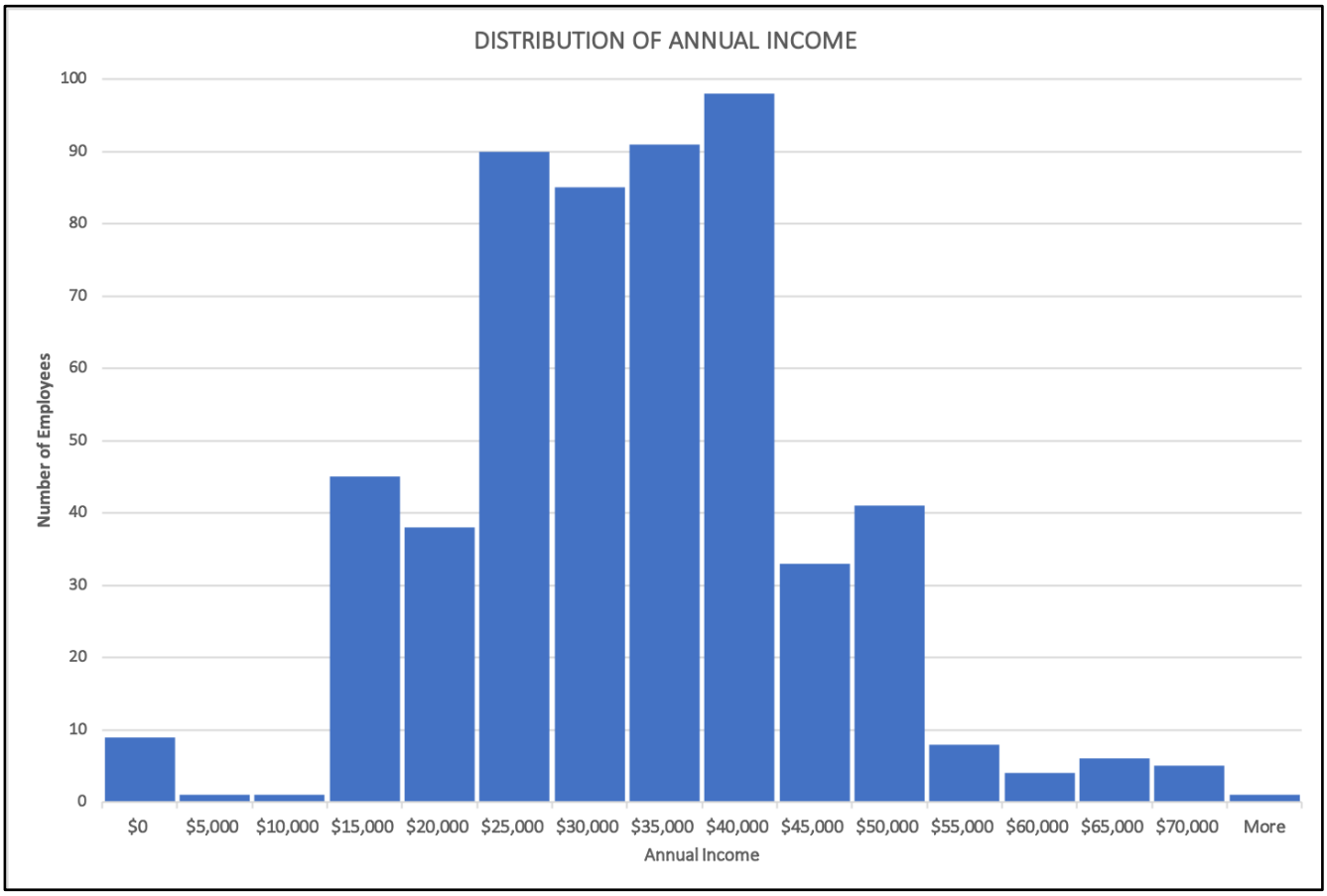


Figure 4

Historical turnover rates of program participants

Below is an Aug-Dec monthly tally of passes that were "activated," meaning physically tagged at a Clipper Card reader at a train station or bus. Each month, a number of new applications for transit passes are processed. Each month there is "turnover," where transit passes are not activated. Unused transit passes are refunded to the TMA. Some downtown businesses have a 200% annual turnover (16% each month) of employees, but the TMA's transit pass program turnover is lower. Lower turnover rate means that the transit pass program subsidy also helps employers retain their employees by giving them a sustainable commute.

TRANSIT PASSES	Aug '18	Sep '18	Oct '18	Nov '18	Dec '18	Jan '19	Feb '19	Mar '19	Apr '19	May '19	Jun '19
Passes Activated	117	149	214	227	241	240	245	229	214	198	187
New applications	36	49	74	33	40	22	28	0	0	0	0
Turnover		17	9	20	26	23	23	16	15	16	11
Percent turnover		11.4%	4.2%	8.8%	10.8%	9.6%	9.4%	7.0%	7.0%	8.1%	5.9%

Table 2: Monthly turnover rate of transit pass program participants

Program utilization by transit operator

Between the four transit providers, 80% of revenue goes to SamTrans (Caltrain or SamTrans bus). A snapshot of June 2019 monthly transit pass outlay shows the percent of transit pass expenditure that goes to each transit provider:

Transit Operator	Passes	Percent	Expenditure
Caltrain	123	62%	$19,503.00
VTA	36	18%	$3,240.00
SamTrans	36	18%	$2,361.60
Transbay DBX	3	2%	$594.00
total	**198**	**100%**	**$25,698.60**

Table 3: June 2019 Downtown Transit Pass Program

Cost-efficacy comparison with other TDM strategies

For comparison to PATMA programs, a sampling of non-PATMA program cost-efficacy is provided below. Cost-efficacy is measured by an employer's cost per year of reducing a single SOV commute. This can also be thought of as the cost of freeing a parking space. Caltrain's Go Pass program charges $285/year for each employee, whether or not they use Caltrain, meaning that cost-efficacy is higher for employers with high Caltrain mode share. In addition to TDM programs, Row #8 provides an estimated annual cost of a new structured parking space to accommodate an SOV commute to downtown.

Row #	For comparison: TDM Program efficacy	Annual cost of non-SOV commute
1	Gates Foundation TDM: $12/day SOV fee yields 32% SOV	-$432
2	"Stanford-like" TDM: $3/day SOV fee yields 50% SOV	$0
3	Self-motivated bike or carpool	$0
4	Go Pass for downtown TechCo at 35% Caltrain mode	$814
5	Go Pass for Stanford campus @ 17% mode share	$1,676
6	Go Pass for an employer with 10% mode share	$2,850
7	Private express bus service from SF, 25 riders	$3,508
8	**New structured parking space (SOV commute)**	$3,908
9	Employer housing stipend to live close to work	$10,000

Table 4: Calculation details are provided in the full report

Compared to typical US TDM program efficacy, PATMA is cost-effective.

PATMA Program Efficacy	Annual cost of non-SOV commute
Waze Carpool	$1,224
Transit Pass Subsidy - pass outlay	$1,572
Transit pass subsidy including staff time: $2,072	
Lyft Program	$1,855
Scoop Program	$2,729

Table 5: calculation details are provided in the full report

Cost pressures and potential for cost reduction

Transit operator economic challenges will continue to result in increased costs for low-income commuters:

Monthly Pass Product	2018 Monthly Cost	2019 Monthly Cost	2020 Monthly Cost
AC Transit Transbay/Dumbarton	$162.00	$198.00	
Caltrain 2 Zone pass	$163.50		$187.50
Caltrain 1 Zone pass	$96.00		$120.00
SamTrans local service	$65.60		
VTA standard service	$80.00	$90.00	

Table 6

PATMA met with Caltrain on November 7, 2018, to explore the potential for a discount, but the effort was unsuccessful. Starting around June 2019, Caltrain began offering low-income discounts for individual Caltrain trips, but not for monthly passes. Unfortunately, on a monthly basis, discounted individual trips are more expensive than monthly passes, consequently, Caltrain's program will not benefit PATMA finances.

Commute obstacles

From the 496 responses to the 2018 PATMA Commute Survey, these responses were split into four employer sub-types: 164 government workers, 137 light office workers, 79 service workers, and 116 technology workers. Service workers, compared to the other three employment sub-types, have higher obstacles to commute alternatives:

- 56% of service workers need to drive to work because they make other stops (second job, school, kids, errands) before or after work. One partial explanation is that service workers often have two jobs in two different locations.
- 38% of service workers need to drive to work because they use their car for meetings, deliveries, or other work-related tasks.
- 42% would rather not drive to work but have no other good options.

As far a transit obstacles, service workers report:

- 47% would take transit to work if the service was faster or more frequent.
- 31% would take transit if parking at transit stops was available.
- 42% would take transit to work if it was easier to get to a transit stop (the first mile problem).

The Bay Area public transit system is fragmented[2], with 27 different operators implementing uncoordinated fares, schedules, strategy, branding, user experience, and capital planning. Despite ongoing investment, per-capita ridership has been declining for years. Though Palo Alto is a major employment center, transit service suffers because it lies at the border of two county bus systems. In addition, ongoing economic pressure on VTA has led to route planning emphasis on their core, densest areas at the expense of the lower-density periphery.

Human/technical challenges and potential equity-increasing solutions

PATMA's transit subsidy program is labor-intensive and prone to both human and technology errors. Each month, about 15% of Caltrain monthly pass commuters "tag on but don't tag off," resulting in negative balances that can result in $75 citations. PATMA intervenes on behalf of commuters to remedy negative balances and has also successfully appealed Caltrain citations.

Potential Incremental Solutions to help low-income transit commuters

- System improvements are underway that will benefit service workers an increase transit ridership. These include:
    - Dumbarton Corridor improvements
    - The Manager's Mobility Partnership's new north/south bike route
    - City of Palo Alto's bike/scooter share program
    - Palo Alto Transit VisionPlan Local Shuttle Service Enhancements
    - Improvements that could spring from the Sub-Regional TMA collaboration called the Manzanita Talks.
- Regional low-income discounts offer potential benefits to service worker commuters.
- The GIS maps in this report could provide some insights into potential new shuttle bus route possibilities.
- Reduced bike stress. A key factor preventing biking is the poor state of roads and the bike network. 60% of Silicon Valley's population is "interested but concerned" about biking and will only bicycle in low-stress conditions. Analysis and improvements are underway to de-stress biking.[3]

Potential non-incremental solutions to help low-income transit commuters

Solutions may include seamless public/private mobility, capping SOV commuting at 50%, robovans, ebikes, major Caltrain improvements, personal rapid transit, higher capacity freeways, and affordable housing production.

[2] "Seamless Transit: How to make Bay Area public transit function like one rational, easy-to-use system," https://www.spur.org/publications/spur-report/2015-03-31/seamless-transit.

[3] Reduce Bay Area Commuting 25%, Section 7A. Bike route stress reduction.

TDM Social Equity Subdiscipline

The U.S. TDM Social Equity Subdiscipline is emerging, with only a few programs beyond PATMA's program. These include:[4]

- In dense urban centers where bike share is prominent, multiple programs offer subsidized membership to low-income travelers. Better Bike Share Partnership is a leading organization.
- The Chicago Individualized Marketing Go Programs, including Go Pilsen, focus on bringing residential TDM to five Chicago neighborhoods that are low-income and highly ethnically diverse. Locally-hired project Ambassadors persuade residents to increase walking, biking, and public transit.
- Los Angeles' People for Mobility Justice organization is a Black Indigenous People of Color (BIPOC) collective that corrects past discrimination in how public transportation benefits and burdens are allocated, maintained, and developed. Those who have had the least should be given the most. The organization educates different audiences, creating a safe learning environment to build consciousness around mobility justice.
- In Austin, Texas, the public housing authority offers a program called Smart Work, Learn, Play, which connects underserved communities with opportunities to increase their use of public transportation. The program recruits "mobility ambassadors" to meet residents where they are, provide one-on-one training on utilizing various tools to access transportation options and work together to advocate for transportation change with City officials.
- King County Metro's ORCA LIFT fare card provides low-income public transit subsidy based on household income. The four-person household maximum income is $48K, one-person is $24K.
- UC Berkeley's Parking & Transportation Department administers the Educational Opportunity Program to provide low-income, first-generation students with better opportunities to take advantage of TDM programs such as scooters and bike share. Being proactive to deliver new mobility services is one step to ensure equitable access to transit is provided and is more than just a "checkbox item."
- San Jose's Sacred Heart Community Service organization sponsors Bus Riders United for Transportation Revitalization, a committee of bus riders organizing for transportation justice, influencing transit agency policy and priorities for improved transit service and increased affordability.
- Oregon Health and Science University provides subsidized Lyft rides, without income qualification (but benefiting multiple low-income commuters), for people commuting between 7 pm and 5:30 am, up to $15 per trip. "We launched this program just last spring and it has been very popular so far, offering a new option to many of our off-peak commuters."
- Research by Portland Metro is defining "How to better design TDM programs that serve communities of color."
- Pleasanton's Hacienda Business Park provides free Wheels local bus EcoPass to all workers and residents within the service area, without income qualification. "A large portion of the users of our transit pass program are service workers and employees with more limited means. The way that the local bus routes are structured, there are strong connections between the more affordable housing in the region (mostly found in Livermore) and the larger employment centers such as Hacienda. We think that this has provided a key piece of affordability for people who work in service industry jobs within Hacienda."
- Contra Costa Centre Transit Village subsidizes a portion of transit passes for low-income workers but does not fund 100% of those passes.

[4] Thanks to the national transp-tdm listserv for listing other equity-increasing programs.

Service Equivalency for the mobility-impaired and other disabled

PATMA's programs are designed to be accessible to all so that no one is treated in a different or inferior manner. PATMA also accommodates changes in programs and services to help everyone equally. People with disabilities have to meet the essential eligibility requirements, such as income needed to participate in PATMA programs, wherever applicable, just like everyone else.

Disability entails having a physical or mental impairment that substantially limits one or more major life activities. According to the World Health Organization, the disabled represent 15% of the world's population. In 2017, approximately 21% of SamTrans bus riders were seniors or people with disabilities. PATMA's transit pass program provides monthly transit passes on four public transit operators, each of which is compliant with the Americans with Disabilities Act. Along with the operators, PATMA provides assistance to disabled passengers in obtaining the information they need. Outside of the transit pass program, disabled passengers may also avail themselves of paratransit services.

Caltrain for People with Disabilities[5]

Caltrain is a wheelchair accessible commuter rail service. Customers can board at all wheelchair-accessible stations using either on-board lifts or an accessible ramp (depending on the type of train). Caltrain has boarding assistance areas where customers who need help boarding or finding a seat can wait. Conductors will look for passengers in this area and will offer assistance. All Caltrain commuter rail trains have at least one wheelchair accessible car. Caltrain allows service animals on the train.

Every train car has priority seats for seniors and people with disabilities. The seats are marked with a sign.

Caltrain offers free travel training to teach people with disabilities how to use the service. They contract with local disability organizations to provide one-on-one training to teach people how to use the service.

People with a disabled parking placard or with a current disabled license plate issued by the Department of Motor Vehicles may park for free at Caltrain parking lots.

Seniors and people with disabilities who present a Regional Transit Connection discount card, a Medicare card or a Department of Motor Vehicles Disabled Person Placard may ride Caltrain at approximately half fare.

SamTrans Bus for People with Disabilities[6]

SamTrans provides high quality service to people with disabilities to go to work, school, shopping or recreational activities.

All SamTrans buses are wheelchair accessible with ramps or lifts. The Bus Operator can lower the bus ("kneel") to make it easier to board.

All buses have an automated system that makes amplified announcements of major transfer points, intersections and destinations. An electronic message board on the bus displays the same

[5] Information provided by SamTrans ADA Coordinator Tina Dubost.

[6] Information provided by SamTrans ADA Coordinator Tina Dubost.

information. External loudspeakers announce the route number and destination of the bus at all stops. An Operator will also announce stops that the customer requests.

Seats near the front of the bus are priority seating for seniors and people with disabilities. The seats are marked with a sign.

SamTrans offers free travel training to teach people with disabilities how to use the service. They contract with local disability organizations to provide one-on-one training to teach people how to use the service.

Seniors and people with disabilities who present a Regional Transit Connection discount card, a Medicare card or a Department of Motor Vehicles Disabled Person Placard may ride SamTrans at approximately half fare.

People who have a disability that prevents them from riding SamTrans some or all of the time may qualify for ADA paratransit. This service is pre-scheduled, demand response service that is comparable to the SamTrans bus service.

VTA bus and light rail for people with disabilities[7]

VTA's transit centers, shelters, and most bus stops are fully accessible. Guidance surface tiles and directional tiles are provided to guide pedestrians with visual disabilities using white canes. Lifts, ramps, and device spaces on buses are maintained at ADA standards to provide access for mobility devices. Most VTA bus stops and at all transit centers, bus stop poles are marked with raised letters and Braille that read "BUS". VTA buses also audibly announce the line number and destination when the doors open at bus stops.

VTA ACCESS paratransit is complementary to the fixed-route transit and provided to eligible individuals. All transit services provide information in accessible formats (large print, Braille, audio tape) and PATMA provides assistance in obtaining the information.

AC Transit bus for people with disabilities[8]

All AC Transit buses are equipped with the following accessibility features:

- Passenger lifts or ramps
- "Kneeling", which lowers the first step several inches to make the first step easier
- Priority Seating near the front of buses, for persons with disabilities and seniors
- Two wheelchair securement locations per bus, each equipped with securement devices which hold the wheelchair safely in place.
- An onboard stop announcement system provides "next stop" audio announcements on many bus routes and, the voice announcements are augmented by internal text-message signs. Sight- and hearing-impaired passengers on buses equipped with this system can rely on the onboard information to help them find a stop or destination.

[7] https://www.vta.org/go/accessibility.

[8] http://www.actransit.org/actrealtime/rider-guides/accessibility/.

Language and program information accessibility

As far as language accessibility, several low-income downtown workers speak Spanish as their first language. For one restaurant downtown, 70% of staff use Spanish as their primary language. PATMA has a Spanish-speaking person on staff to make participation easier and for helping commuters succeed in using their passes. On several occasions, PATMA overcomes the language barrier using tools such as Google Translate to provide a seamless customer experience. Moreover, PATMA commute surveys are available in Spanish as well as English. PATMA can also provide interpreter services for language assistance other than Spanish. In addition, participating employers often assist their Spanish-speakers in navigating the program.

As far as program information accessibility, PATMA's web is accessible to an extent in that the images, text, graphics and site structure are prepared to increase performance with assistive technologies. For assistance with monthly pass renewals, PATMA can provide with assistance and communicate the renewal confirmations and such via phone. PATMA can also fill out transit pass applications on behalf of the commuter. Where PATMA struggles in providing accessibility services, specialists are hired to provide the best possible service. In addition, participating employers often assist their Spanish-speakers in navigating the program.

Service Equivalency for the unphoned and underphoned

The unphoned are those with no cell phone of any kind. The underphoned are those with a flip phone; a no-contract phone; another basic device that lacks important capabilities; or a phone with capabilities the owner cannot, or chooses not, fully to use. PATMA's monthly transit pass program workflow features communication with commuters to verify that they would like to renew their transit pass. This communication occurs using SMS or email. To date, no commuters have needed accommodation for the renewal process, but PATMA will collaborate with employers to address a communication deficit, should one arise.

Cellphone ownership is now very high in the US, at 92% for non-high school graduates, 96% for Latinx commuters, and 95% for commuters earning less than $30,000 per year.[9] Feature-rich smartphone market penetration has increased from roughly 40% in 2011 to 80% in 2018. Cellphone and smartphone market penetration can be expected to increase each year.

[9] Pew Research Center: Internet and Technology's Mobile Fact Sheet: https://www.pewinternet.org/fact-sheet/mobile/ .

	Own smartphone	Own cellphone
Race / ethnicity		
White	82%	96%
Black	80%	98%
Latinx	79%	96%
Annual Income		
Less than $30K	71%	95%
$30K-$50K	78%	96%
$50K-$75K	90%	98%
$75K+	95%	100%
Education		
Not high school graduate	66%	92%
High school graduate	72%	96%
Some college	85%	96%
College graduate	91%	98%

Table 7

Service Equivalency for the unbanked and underbanked

The unbanked are those with no checking, savings, or credit card account. The underbanked have an account but continue to rely on alternative financial services, like check cashing services, payday loans, pawn shops, or rent-to-own agreements. PATMA's transit pass program provides Clipper fare media cards to the unbanked and underbanked, eliminating their fare payment obstacles to utilizing public transit.

APPENDIX

10

Parking Methodology Memo

Mobility on Demand
Fair Value Commuting (FVC) Demonstration

Understanding the Cost of Employer-Provided Parking

Introduction: Why Calculate the Cost of Employer Parking?

Employers need to attract and retain talented, qualified, and motivated workers to ensure sustainability and efficiency of operation. Free or subsidized employee parking is one type of benefit, whether codified or implied, that can be used to attract or retain employees. However, there are many costs to the employer to provide parking. Employers may not realize that these expenditures help subsidize driving as a commute mode.

In the interest of fairness to employees who do and don't drive to work, it is informative to understand and compare the costs (or value) of all employer-provided commuter subsidies. While a carpool subsidy of $30 per month is simply quantified, calculating the cost of parking can be much more complex. Parking is an especially timely topic, as the externalities of car use are now more widely acknowledged, including congestion and greenhouse gas emissions. Further, not all employees own a car or commute by car, and subsidies for other modes of transportation are increasingly likely to be valued as much as subsidized parking.

Costing Methods

Direct and Indirect Costs

The most localized method to estimate parking costs would be to assess the employer's capital, operational, and indirect costs of providing employee parking. Consider these topics:

- Allocation: Where a parking facility is shared with non-employees, e.g., the public, the total costs should be allocated between employees and non-employees.
- Capital costs and debt costs can be averaged/amortized over a number of years based on expected life of the facility. Capital costs can include the cost of land, construction, material, energy, debt burden, and soft costs.
- Operational costs are often shared with other facilities. Care should be taken to allocate or define costs for parking facilities. Operational costs to consider include:
    - Cleaning
    - Utilities
    - Insurance
    - Maintenance and repairs
    - Landscape costs
    - Salaries/wages and benefits of people operating parking facilities (parking enforcement, security, valet)
    - Vehicle and equipment financing
    - Data/credit card processing
    - Rent/leases
- Indirect costs can include environmental costs due to construction materials and energy usage, as well as costs related to automobile emissions and pollution, increased urban

runoff, and others. There are also opportunity costs to using land for parking instead of alternative uses that may be of more value to the community. These could include expanded work facilities, retail businesses, restaurants, sidewalk cafes, public parks, campuses or athletic facilities.

Revenue-Based Value

The market value of parking can also be considered for this purpose (not for employer tax calculation purposes):

- Parking fees charged to employees (for example, monthly or annual permits)
- Parking fees charged to employees' sponsoring departments (for example, monthly or annual permits)
- Parking fees charged to non-employees (for example, hourly or daily fees)
- Wider economic opportunity cost (in the case of public parking, is there broader benefit to the community if an employee does not park in the parking facility and the parking is available for retail activity?)

For example, based on a meeting in February 2019, Redwood City municipal parking management staff indicated that the retail value of their downtown municipal parking is $4,400 per space per year, based on their parking fees ($1 per hour) and observed usage patterns.

Recommended Reading

Parking costs can also be estimated using rules of thumb, comparable cost studies, etc. Consider the following resources:

- The Victoria Transport Policy Institute publishes an online Transportation Cost and Benefit Analysis (also used as the base reference for this note) that cites a large number of studies that have assessed various aspects of parking cost. One study cites development in-lieu fees charged by Palo Alto and other Bay Area cities as a proxy for the cost of parking construction. When using reference studies, compare with sources that best approximate the employer's local conditions and parking facilities, for example the type of facility (structured, at-grade, underground) and density (rural, suburban, urban).
    - Victoria Transport Policy Institute, *Transportation Cost and Benefit Analysis*, 2018.

- Donald Shoup, distinguished research professor of Urban Planning in the Luskin School of Public Affairs at UCLA, is widely recognized for his research on parking policy. He argues that city parking policies subsidize cars and encourage sprawl, and criticizes how parking is planned and regulated, especially the use of parking minimums and off-street parking requirements. He then offers strategies for parking reforms and reports on the progress that cities have made in adopting these reforms.
    - Donald Shoup, *The High Cost of Free Parking*, Chicago: Planners Press, 2005 and 2011.
    - Donald Shoup (ed.), *Parking and the City*, New York: Routledge, 2018.

- Richard Willson, Professor and Chair in the Department of Urban and Regional Planning at Cal Poly Pomona, addresses how to reform parking requirements in a way that supports planning goals. He offers tools and methods for strategic parking management so that communities can better use parking resources and avoid overbuilding parking.
    - Richard Willson, *Parking Management for Smart Growth*, Washington D.C.: Island Press. 2015.
    - Richard Willson, *Parking Reform Made Easy*, Washington D.C.: Island Press. 2013.

APPENDIX

11

Pilot Site Assistance Memo

Mobility on Demand
Fair Value Commuting (FVC) Demonstration
Program Assistance for Employer Pilots

The City of Palo Alto and Prospect Silicon Valley (ProspectSV) will assist each employer pilot site throughout the FVC Demonstration by doing the following:

1. Program Set Up
    - Work with you on initial steps including data gathering, TDM policy assessment, payroll policy/administration
    - Interface with you and the Independent Evaluators for baseline surveys
    - Coordinate discussion of feebate carrot/stick or cash out policies

2. Marketing and Support
    - Work with you to set up a marketing and deployment schedule
    - Coordinate the development and dissemination of marketing materials by vendors for your use
    - Coordinate with you and vendors on specific campaigns, such as contests or challenges

3. Deployment
    - Provide status about software development and timelines
    - Coordinate meetings between you and software vendors to learn about available features and to discuss integration at your site
    - Help define a customized schedule for deployment at your site
    - Coordinate with vendors for launch support and ongoing employee support
    - Help you to review vendor reports and to propose modifications to your program
    - Coordinate with Independent Evaluators for ongoing surveys/data gathering
    - Organize recurring check-ins with all Commute Champions

4. Wrap Up
    - Convene "lessons learned" meetings with you and project team members
    - Draft and share project reports with you for review

In addition, the City and ProspectSV will handle project-wide administration and reporting tasks, aiming to allow you to focus on implementation of the project at your site.

Project Contacts:
Hillary Rupert, City of Palo Alto—Hillary.Rupert@CityofPaloAlto.org • 650-776-9208
Gary Hsueh, Prospect Silicon Valley—gary.hsueh@prospectsv.org • 510-334-1976

APPENDIX

12

Potential Commuter Benefits Memo

Mobility on Demand Fair Value Commuting (FVC) Demonstration
Potential Commuter Benefits

This document outlines types and methods of industry-standard commuter benefits. There is a vast array of benefits and Pilot Partners are encouraged to consider their specific employee context. Some specific methods may not be reimbursable through the federal grant program.

Rewards/Prizes	• RideAmigos contests, challenges
	  ○ Earned upon achieving specified goals
	  ○ May include prize drawings for higher-value items
	• Merchandise:
	  ○ Transportation-related supplies, accessories, clothing
	  ○ Employer branded merchandise
	  ○ Electronics, retail goods
	  ○ Vacation trips
	• Gift certificates, gift cards
	  ○ Local merchants, restaurants, bike shops, retailers
	  ○ Online retailers, transportation related or not

Transportation Subsidies	• Modes:
	  ○ Transit (BART, Caltrain GoPass, Samtrans, VTA Ecopass, ACE Train, DB Express, AC Transit)
	  ○ Parking at transit stations
	  ○ Bikeshare, scootershare
	  ○ Lyft Shared/Uberpool
	  ○ Vanpool
	  ○ Shuttle service
	  ○ Carpool Matching (Scoop, Waze Carpool)
	  ○ Guaranteed Ride Home
	• Methods:
	  ○ Commuter Check
	  ○ Benefits processor loads debit card
	  ○ Direct payroll contributions
	  ○ Expense reimbursements
	  ○ Pre-tax (IRS):
	  ▪ transit/carpool: $265/mo 2019
	  ▪ parking: $265/mo 2019
	  ▪ bike: $20/mo 2019

Equipment and Services	• Employer-loaned transportation equipment (E-bikes/Scooters) • Employer-provided bike lockers / secure bike parking, etc. • Discounts, gift cards to local bike shops

Parking Cashout	• $x/trip or day or week or month in exchange for not driving (parking)
	• Methods:
	  ○ Commuter Check
	  ○ Benefits processor loads debit card
	  ○ Direct payroll contributions
	  ○ Gift certificates, gift cards

Revenue	• Charge for parking • Fee for driving (mileage, time of day, occupancy based) • Parking equivalency: analyze the cost of providing free parking: "How much does the City spend to subsidize driving?"
Policies (to discourage driving)	• Permits/passes: designated parking, restricted parking, time limits, frequency of renewals ○ Designate carpool only parking • Parking enforcement, citations

APPENDIX

13

SPUR White Paper

SPUR

Driving Change

Policies to expand on employer-based Mobility on Demand pilot programs and reduce drive-alone commuting in the Bay Area

By: Sarah Jo Szambelan

This project has been generously supported by a grant from the Federal Transit Administration's Mobility on Demand Sandbox program. The grant has also been managed and shared by the City of Palo Alto. All errors are the author's.

Executive Summary

The Fair Value Commuting (FVC) Demonstration project began in Silicon Valley in mid-2018 to help an innovative region address challenges that have plagued cities and regions for decades: Too many people drive alone to work, and as a result roads are clogged with traffic, people and employers lose time and productivity, air quality is degraded and streets are unsafe.

The project tests a package of strategies to tackle these challenges. First, from July through December 2019, four public-sector employers (the cities of Palo Alto, Menlo Park, Mountain View and Cupertino) piloted parking cash-out — giving cash, transit or other subsidies to employees who do not drive alone to work. These commuter benefits were communicated though software called a commuter wallet. Trips were then tracked and summarized for employees and employers alike through another software system. Second, an analysis of commutes and the barriers to options other than driving alone — ways to travel the last mile(s) between a transit station and an employer's front door, for example — will also be conducted as part of the FVC project. Lastly, the role of public policy in supporting FVC pilots and shifting workers out of drive-alone commutes is examined in this white paper.

This paper outlines many of the underlying factors that shape the challenges the FVC pilots aim to address. The region's sprawling nature and lack of affordable housing near many job sites make it particularly difficult for employers to shift workers out of drive-alone commutes.

In addition, the FVC pilots come at a time when many large employers offer workers pre-tax transit benefits or subsidized transit passes, and when many large employment districts opt to offer workers free shuttles from major transit stops, incentives to carpoolers and more. Yet these efforts have not been enough to stem the region's congestion, emissions and unsafe roads during commute hours. When it ends and can be evaluated, the FVC project stands to offer more insight on how employer-based parking cash-out can be implemented to complement existing employer-based efforts.

In the meantime, this paper offers information and insight to help employers and policymakers discuss and work toward policies that will help employers to: continue their FVC efforts beyond the pilot's closure at the end of 2019; include more workers in pilot offering; encourage new employers to set up parking cash-out programs; and ultimately shift more workers out of drive-alone commutes.

In particular, this paper also offers two large regional policy ideas and several supporting policy ideas:

Regional policy ideas for discussion:

- **Regional baseline parking charges**: Amid competition for talented workers, the four pilot sites found it difficult to charge for parking as a way to shift drive-alone behavior and create a revenue stream to fund parking cash-out subsidies. A regional baseline parking charge could level the playing field for employers and potentially provide a powerful tool in the ongoing effort to stem drive-alone commute rates.
- **Regional transportation demand management requirements**: While many employers in newer developments have transportation demand management policies, many other employers do not. A regional mandate that employers help expand the commute options for their workers — through providing greater incentives to carpool, better communication of benefits and more — could go a long way in shifting workers out of drive-alone commutes.

To complement either of these regional polices, this paper outlines for discussion additional strategies to:

- Create better commute monitoring and data so that pilots and policies can be better evaluated
- Create a regional parking database that can serve as a tool to employers and policymakers at the city, county and regional levels
- Ensure that employees of small employers have access to the same transportation demand management incentives as those with larger employers
- Establish software platforms to streamline travelers' payments across parking, transit, tolls and more
- Ensure coordination on parking pricing between cities and employers
- Continue ongoing work to improve transit, biking and other alternatives to driving alone

The work to design, pilot and implement these policies is real. Charging for parking that has always been free is particularly difficult. However, it may prove harder for the Bay Area to live with the consequences of doing nothing. Staggering traffic congestion has peaked at all-time highs, emissions from cars is the single largest source of climate emissions, and pollution from cars settles in low-income communities and communities of color, contributing to higher rates of heart and respiratory disease. Not only are these negative impacts large, they are widespread and often fall not on the people who drive but on those taking the bus or living in neighborhoods near freeways. While creating policies to shift workers out of drive-alone commutes is not costless, it is important to remember that we are already paying for drive-alone commutes in these other ways.

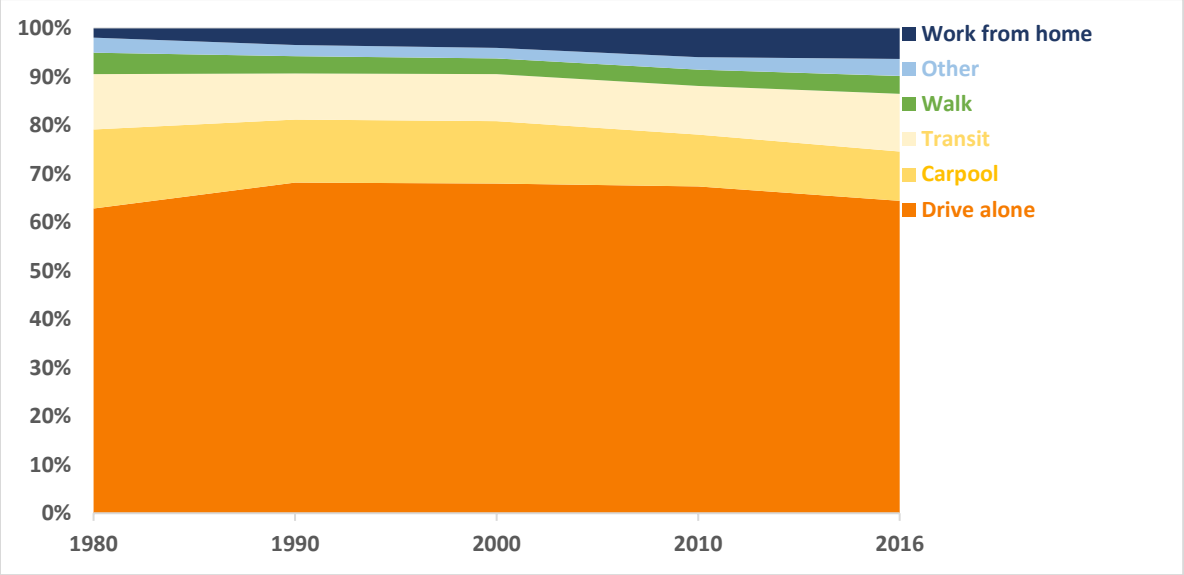
This paper celebrates the work of employers in the FVC pilot and encourages policymakers and employers to continue the conversation about how to reduce drive-alone commutes and help make our region less congested, cleaner and healthier for all who live and work here.

1. Introduction

For Bay Area residents, the decision about how to get to work is a simple one. Most get in their cars and drive alone. This decision is often so automatic that it's more of an assumption than a choice. This assumption is reflected back to commuters by the physical environment around them: the wide roads, long distances and abundant parking lots that stretch between home and work. And it is reinforced by the fact that it's often faster and cheaper to drive alone than to take transit, not to mention more convenient and comfortable than walking, biking or carpooling.

It's no surprise that driving alone is and has been the dominant commute choice for Bay Area workers over the last several decades, as seen in Figure 1 below.

Figure 1. For decades, two thirds of Bay Area commuters have driven alone to work
Subtitle: Percentage of commute trips in the nine-county Bay Area taken by each mode
Caption: Since 1980, the percentage of people who drive alone to work has hovered around 66% and the rate for those who take transit has held at about 11%. Meanwhile, the carpool rate has dropped from 16% to 10%, and the work from home rate has risen from 2% to 6%.



Source: SPUR rendering of MTC's Vital Signs historical commute mode choice: http://www.vitalsigns.mtc.ca.gov/commute-mode-choice

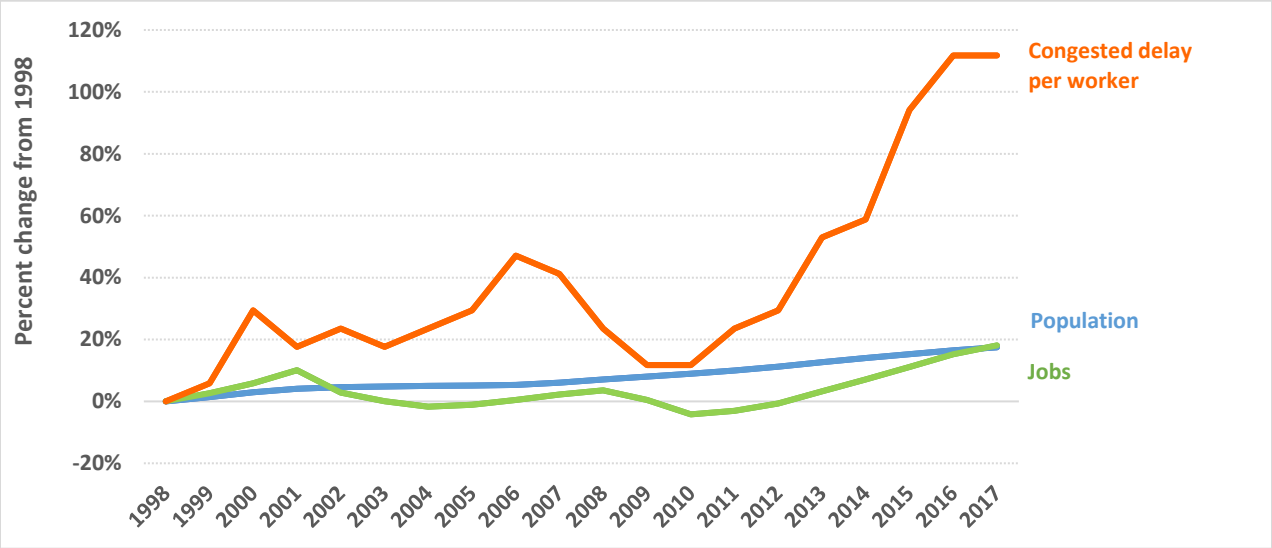
Despite how easy it is for most to drive alone to work compared to other modes, it is not without consequence. Passenger vehicles remain the region and state's single largest source of climate emissions and a major source of local air pollution, which contributes to lung and respiratory disease.[1] Local air degradation and its health impacts also concentrate in low-income communities and communities of color, exacerbating long-standing racial and economic inequities that erode the quality of life in the region. In addition, with more drivers on the road, the potential for injury and death across drivers, passengers, pedestrians, cyclists and bus riders goes up. Lastly, travel throughout the region has come to cost people more and more of their time and productivity, as seen in Figure 2 below.

[1] See page 5 and 7: https://www.spur.org/sites/default/files/publications_pdfs/SPUR_Fossil_Free_Bay_Area.pdf.

Figure 2. Congested delays have plateaued at all-time highs

Subtitle: Percent change in jobs, population and congested delay per worker since 1998[2]

Caption: While population and workers in the nine-county Bay Area have risen by 17% and 18% respectively since 1998, the congested delay per worker has risen by 112%, demonstrating that our transportation system cannot fit more solo commuters without costing everyone time.The congested delay per worker trend line below also mirrors (and exaggerates) jobs lost in the Great Recession (2007 to 2010) and the climb in jobs after its recovery (2010 to 2017).



Source: SPUR rendering of MTC's Vital Signs time in congestion: https://open-data-demo.mtc.ca.gov/dataset/Vital-Signs-Time-in-Congestion-Bay-Area-updated-Oc/ja9p-vpfm

The serious and widespread problems that come with our region's reliance on driving alone are not new. Policymakers have invested millions in critical transit infrastructure and services throughout the region, and cities and employers have taken steps to encourage commuters away from driving alone through some of the most comprehensive transportation demand management (TDM) programs in the country. While important, these efforts have simply not been enough to reverse the growth of congestion, pollution and safety threats from cars. Innovative solutions and leadership in overcoming our entrenched drive-alone patterns are still sorely needed.

The Fair Value Commuting (FVC) project and this paper aim to test and help scale a package of strategies to reduce drive-alone commute trips.[3] While commutes are not the only type of trip people take, they do represent up to a third of all trips taken in the Bay Area,[4] and because they mostly cluster around

[2] Congested delay per worker is measured in the number of vehicles on the road, multiplied by the time they spend traveling at speeds below 35 miles per hour, divided by the total number of workers: http://www.vitalsigns.mtc.ca.gov/time-spent-congestion.

[3] The project has been funded by the Federal Transit Administration through the Mobility on Demand Sandbox Program, and aligns with its mission to promote efficient, effective, customer-oriented multi-modal trip options, especially as smart phones and faster data processing change how people get around. See more at: https://www.transit.dot.gov/research-innovation/mobility-demand-mod-sandbox-program.

[4] While commute trips as a percentage of total trips are not measured throughout the Bay Area, survey data from San Francisco gives us this order of magnitude estimate. See page 10: https://www.sfmta.com/sites/default/files/reports/2017/Travel%20Decisions%20Survey%20Summary%20Report%202017_Accessible.pdf . The author assumes about a third considering that some trips to "home" include trips directly from work to home.

peak hours, they cause more congestion than other trips, and are often when emissions from idling cars and safety threats also peak. So while they're not the majority of trips, encouraging commuters out of cars can go a long way to mitigating the collective and harmful impacts of driving.

The FVC project is a package of interventions with five main elements:

1) **Voluntary pilot programs at employer sites.** In all pilots, employers have chosen subsidies as a way to encourage commuters not to drive alone. The most popular subsidy, called parking cash-out, offers commuters who do not drive alone to work a cash payment. Another popular offering is a first mile/last mile subsidy that can be used in conjunction with an employer provided benefit such as a preloaded transit or Clipper fare card. Pilots were created at four employers in Silicon Valley — the Cities of Palo Alto, Menlo Park, Mountain View and Cupertino.
2) **Commute data tracking software.** Enterprise commute trip reduction (ECTR) software enables employers and employees alike to see dashboards that track and summarize commute choices over time. It also enables the pilot site employers to administer competitions among employees, prizes, and rewards to encourage employees to not drive alone to work. For this project, RideAmigos is the platform used to record all employee commute trip activity, provide leaderboards, and administer commute competitions.
3) **Commuter Wallet software**. The commuter wallet is a mobile and desktop software platform that commuters can use to plan intermodal (e.g., bike-to-transit, drive-to-transit) trips in real-time, to view benefits offered by their employer's pilot program, and as an integration feature, to facilitate the recording of selected trips into the ECTR software.
4) **Commute gap filling measures**. This part of the project aims to analyze how alternatives to driving alone can be bolstered for specific commuters. For example, this analysis may find it worthwhile to subsidize ride-hailing trips; provide e-bikes, e- scooters or micro-transit; or improve the bike network to get commuters between major transit stops and employer sites.
5) **Policy options and systemic barriers.** This white paper provides the fifth element of this project. It complements the components above by investigating and outlining how the FVC demonstration project can inform future public policy to reduce drive-alone commute rates, as well as how public policy can further support innovative efforts like the FVC pilot project.

At the inception of this project, the FVC team anticipated that in addition to providing parking cash-out and other incentives, employer pilot sites would also opt to charge for parking. The FVC team promoted the idea of a "feebate," where employers charge for parking and use the revenue to fund the incentives for not driving alone to work. In the process, parking charges could generate a revenue source to keep parking cash-out going after the pilot programs ended. However, it proved infeasible for employers to charge for existing parking in the pilot time frame, either alone or as part of a feebate. While it did not make its way into the FVC pilots, in numerous other applications, charging for parking has shown to be an effective way to reduce drive-alone rates and create a sustainable revenue source for parking cash-out and other incentives. Even though parking charges have not been incorporated into FVC pilots, they hold promise, need further policy investigation and are discussed throughout this white paper.

As part of the Mobility on Demand FVC project, this paper has a wide audience. It is intended for employers and policymakers at various levels of government who are interested in how employer-based efforts and public policy can work together to reduce drive-alone commute rates. It is also intended for those generally invested in the Bay Area's commute conditions, policies and employer-provided benefits

and in how each can be improved to ease congestion and emissions and ensure greater commuter options for more people.

Overall, this paper brings together in one place the broader conditions and public policies that set the region's current commute context (Section 2). It discusses existing employer-based efforts to reduce drive-alone commute rates in the Bay Area, giving examples of both parking pricing and incentives, and barriers employers face in providing each (Section 3). It also outlines and synthesizes lessons learned from key public policies that affect Bay Area employer-based commuter benefits (Section 4). The paper then outlines two major regional policy ideas and a set of supporting policies that could help employers scale the types of commuter benefits offered through the FVC pilots (Section 5).

2. The Bay Area's Context: Why Commuters Drive Alone

As described briefly above, there are important reasons why so many in the Bay Area drive alone to work. The spread-out nature of job centers and residential neighborhoods across the Bay Area, the high cost of housing and the lack of viable alternatives to driving alone play key roles. These patterns are important to highlight, as they illustrate the particular challenges that employer-based programs like the FVC pilot programs aim to help overcome. In addition, innovations from the FVC pilots that ultimately shift workers out of drive-alone commutes should be highlighted and supported through additional public policy.

Regional land use patterns and housing market forces reinforce the drive-alone commute.

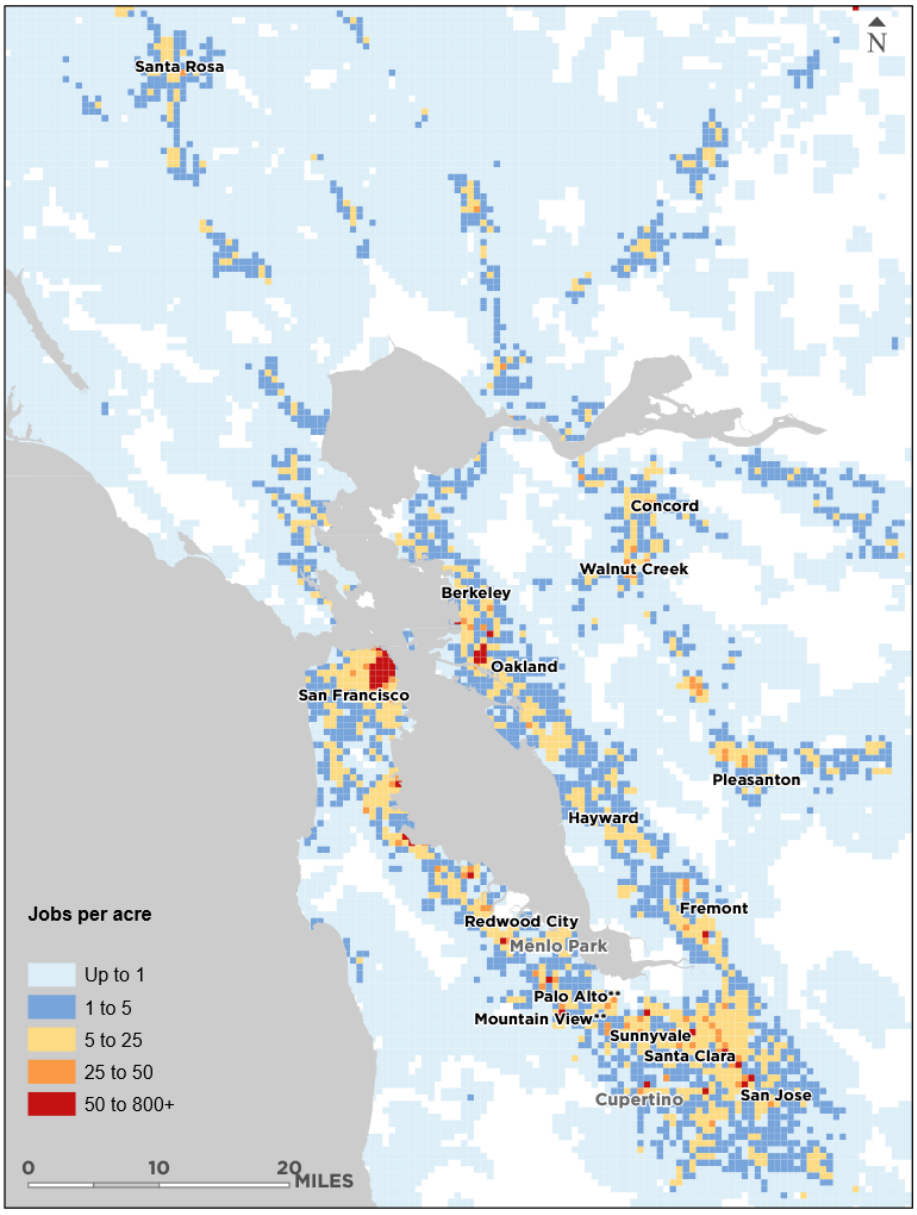
As opposed to having a primary central business district, the San Francisco Bay Area has multiple job centers spread out across nine counties and separated by a 550 square-mile bay, larger in area than Lost Angeles or San Jose and San Diego combined.[5] It is harder logistically and costlier to provide alternatives to driving, such as high-frequency transit, across so many disparate job centers compared to a single job core.

In addition, many of the Bay Area's job centers and residential neighborhoods were built after car use became widespread. They were designed at low densities around large blocks that are fastest and most comfortably navigated by car. Unfortunately, this environment is slower and less convenient for those using transit, walking and other modes. In fact, roughly only 20% of jobs are within a walkable half-mile of the most used regional rail operators, BART and Caltrain.[6]

The region's fierce competition for scarce and expensive housing, and its competition for knowledge workers to support its near-full employment, also mean more and more people commute to work across greater distances, which are most often faster and cheaper by car. These trends vary over the region's large expanse, but they are particularly pronounced in Silicon Valley and along the peninsula that connects it to San Francisco. This nexus of the peninsula and Silicon Valley is where the FVC pilots are taking place.

[5] San Francisco Bay Conservation and Development Commission: https://bcdc.ca.gov/bay_estuary.html.
[6] See page 22: https://www.spur.org/sites/default/files/publications_pdfs/SPUR_Rethinking_the_Corporate-Campus.pdf.

Figure 3. The Bay Area's many job centers help make driving alone the top commute mode
Jobs per acre, shown by quarter square mile
Just fifteen cities labeled in black below host 55% of the region's 3.9 million jobs, but they span 100 miles from Santa Rosa in the north to San Jose in the south. Job density across cities also varies — it is greatest in downtown San Francisco and Oakland and much lower across the Silicon Valley cities from Redwood City to San Jose. Palo Alto and Mountain View, indicated with asterisks, are home to large job centers and each hosted a FVC pilot. In gray, Cupertino and Menlo Park are not in the top 15 largest job cities, but each hosted a FVC pilot.



Source: SPUR analysis of US Census Bureau Longitudinal Employer-Household Dynamics data for all jobs in 2017

Figure 4. Across job centers, Bay Area commutes have gotten much longer in the last 15 years
Average commute in miles (2002 and 2017)
The cities below are listed in order of largest to smallest job center. Most cities have seen the average commute grow in miles by more than 30%.[7]

	Average commute in miles		Percent change
	2002	2017	2002 – 2017
San Francisco	28	38	35%
San Jose	24	34	39%
Oakland	22	31	42%
Fremont	25	39	56%
Santa Clara	28	36	26%
Palo Alto*	23	34	47%
Sunnyvale	24	35	48%
Mountain View*	23	28	24%
Pleasanton	42	44	5%
Hayward	28	44	58%
Santa Rosa	19	31	59%
Redwood City	24	39	58%
Walnut Creek	32	39	24%
Berkeley	16	26	67%
Concord	27	37	40%
Cupertino**	22	26	18%
Menlo Park**	20	32	60%

** Indicates cities in the top 15 that are host to a FVC pilot*
*** Indicates cities not in the top 15 but that are host to a FVC pilot*
Source: SPUR analysis of US Census Bureau Longitudinal Employer-Household Dynamics data for all jobs in 2017

Alternatives to driving alone are often slower and costlier.

Even in the areas where an alternative to driving alone is possible, solo driving is often faster and cheaper. For example, transit trips are often longer because with over two dozen transit agencies serving the Bay Area, they often require travelers to transfer from one transit operator to another. Even without transfers, buses are often also stuck in traffic and both bus and train service can be infrequent, making it faster to drive much of the time. In addition, it is often more expensive to pay a single long-distance fare, or multiple fares on multiple transit legs, than to pay for fuel and free parking as a solo driver. For the Bay Area's workers who commute to work outside of peak hours, transit service is sparse and infrequent. Given this context, it's no wonder that roughly two-thirds of commuters drive alone to work.[8]

[7] Averages have been weighted by number of jobs.
[8] Drive-alone commute rate for 2016 based on the Metropolitan Transportation Commission's Vital Signs data: http://www.vitalsigns.mtc.ca.gov/commute-mode-choice.

3. Existing Employer Efforts to Reduce Driving Alone Rates

All kinds of employers — from public agencies to Silicon Valley tech firms, from medical providers to restaurants and hotel owners — are acutely aware of how difficult it can be for their employees to get to work. The Bay Area commute affects employers' ability to hire and retain workers, as well as to maintain or grow operations.

Many employers in the Bay Area must compete for talented workers, especially in the past several years of near-full employment.[9] Because Bay Area commutes are among the tough, many employers try to attract talent by offering commute benefits and perks, even providing shuttles or ferry services themselves. Providing shuttles or ferries is easier for larger companies with more capital, while family-owned businesses and service-industry employers cannot offer such high price tag perks. In many cities in Silicon Valley, hiring retail, restaurant and hospitality workers has become increasingly difficult given that housing there is far too expensive for the wages such jobs pay, and employers cannot either attract such employees from the distances where there is affordable housing or offer commute benefits that would make it worthwhile.

In some places across the Bay Area, groups of employers have come together to enhance the transit, bike and other drive-alone alternatives for workplace destinations. Some employers have organized themselves under transportation management associations (TMAs), and in other cases, cities have mandated that in particular areas, developers and new employers put in place transportation demand management (TDM) measures as a condition of building new commercial, retail or other job sites. Across most of these efforts, employers use some kind of benefit to encourage their employees not to drive alone to work. These benefits come in the form of free shuttles between regional rail stations and employer sites (e.g., Emeryville's Emery-Go-Round and Stanford's Marguerite shuttles), bike parking and showers at employer sites, priority parking for vanpools and carpools, and more. See the sidebar below for more on TMAs and TDM programs in the Bay Area.

Because employers can know so much about where employees are coming from and what it's like to commute to a particular campus, building or set of sites, employer-based TDM programs can offer more tailored incentives and programs than most other policies. This is a unique advantage in the set of policy options to reduce drive-alone commute rates. It is also one of the reasons it is so important to capture the lessons learned from existing TDM program, as well as from the FVC pilots, and to create public policies that will help scale their most beneficial elements.

BEGIN SIDEBAR
Examples of transportation demand management across the Bay Area

What are transportation management associations (TMAs)?
TMAs are nonprofit organizations that offer transportation services for a particular area, such as an industrial office park, a medical campus, a mall or retail outlet, or an entire employment district. In most cases, they are run by the member businesses with support from local government. Often with the support of city policy, TMAs often help provide transportation demand management (TDM) programs across a number of member businesses, which helps to lower the overall cost of the program and ensure that small employers can offer the same benefits as larger employers.[10]

[9] http://www.bayareaeconomy.org/bay-area-job-watch-42/
[10] https://www.vtpi.org/tdm/tdm44.htm

What kinds of TDM programs exist throughout the Bay Area, and what have they helped to achieve?

The summary table below provides an example of some of the TDM programs provided across the five most urbanized Bay Area counties, the context under which each operates, the notable TDM features of each, and, if measured, the drive-alone commute rates they help to achieve.

While not intended to be a complete list, this table gives a range of the region's TDM offerings across the Bay Area's five most urbanized counties. In addition to what's listed here, many of these programs also offer commuter information, guaranteed rides home for non-drivers, bike incentives and more.

In Figure 5, drive-alone rate goals represent quantitative targets set by cities, TMAs or universities. The one for Stanford is not a precise percentage but rather a goal to not add any more commute trips over time. One of the most popular TDM measures listed here is free shuttle service to major BART, Caltrain or ACE passenger rail stations. "Parking management" refers to policies to unbundle parking from workplaces in commercial leases or to limit the amount of new parking developed. Carpool incentives range from subsidies offered through Waze or Scoop apps, to subsidies for vanpools and preferred parking for carpoolers. Even though offering some kind of carpooling benefit is fairly common, carpooling rates still hover around only 11% across the Bay Area.[11] "Trip challenges" refers to contests or rewards that commuters can participate in by using platforms like RideAmigos to log commutes they made using modes other than driving alone; in doing so, they can earn rewards or become eligible to win prizes.

The effect of these area-wide TDM efforts on drive-alone commute rates is sometimes tracked and reported through surveys. While it appears that the Emeryville TMA does a worse job than the rest of the county at helping workers get to work using modes other than driving alone, it's important to remember that many other job centers in Alameda County are much better served by BART (e.g. downtown Oakland, Hayward and San Leandro). In the case of the Mission Bay TMA and the TDM efforts across Stanford University and Stanford Research Park, efforts are effective at reducing drive-alone commute rates compared to the county average.

END SIDEBAR

[11] Estimated by SPUR using US Census Transportation Planning Products table A302103, 2012-2016 5-year estimates

Figure 5. TDM programs across the Bay Area are numerous and varied in their offerings

			TDM measures						
County	**TDM manager(s)**	**Context**	**Drive-alone rate goal**	**Free shuttle to rail**	**Parking management**	**Carpool incentives**	**Trip challenges**	**TMA drive-alone rate**	**County drive-alone rate[12]**
Alameda	Emeryville TMA & City of Emeryville	Mixed-use employment district along I-80 freeway corridor with: ~ 9,000 residents ~27,000 employees[13]	✗	✓	✓	✗	✗	77%[14]	69%
	Hacienda Business Park & City of Pleasanton	Large, mixed-use development along I-680 freeway corridor with: ~ 4,000 residents ~17,500 employees[15]	55%[16]	✓	✗	✓	✗	--	
Contra Costa	Bishop Ranch & City of San Ramon	Large business park along I-680 freeway corridor with: ~30,000 employees[17]	✗	✓	✗	✓	✗	--	71%
San Francisco	Mission Bay TMA	Urban mixed-use development with: ~14,000 residents ~15,000 jobs, growing large event centers[18]	✗	✓	✓	✓	✗	~20%[19]	34%
San Mateo	Commute.org	Countywide TDM service for all San Mateo employers and commuters: ~ 770,000 residents ~ 374,000 employees[20]	✗	✗	✗	✓	✓	71%	71%
Santa Clara	Stanford Research Park TMA, Stanford U	Employment center/large university with: ~ 29,000 SRP employees[21] ~ 17,000 university students[22] ~ 13,000 university employees[23]	✓	✓	✓	✓	✓	~43%[24]	75%
	Mt. View TMA & City of Mt. View	Office parks and large job centers with: ~83,000 residents[25] ~79,000 employees[26]	45%[27]	✓	✓	✓	✗	--	

[12] Estimated by SPUR using US Census Transportation Planning Products table A302103, 2012-2016 5-year estimates.
[13] Page 1: http://www.ci.emeryville.ca.us/DocumentCenter/View/285/Parking-Study?bidId=.
[14] Page 3-3: https://www.ci.emeryville.ca.us/DocumentCenter/View/1010/30-Transportation?bidId=.
[15] https://www.bestworkplaces.org/bwc-employer-spotlight/bwc-spotlight-hacienda-pleasanton-ca/.
[16] Page 27: https://www.alamedactc.org/wp-content/uploads/2018/12/ALAMEDA-TDM-Strategy_final.pdf?x33781.
[17] https://www.bishopranch.com/more-than-80000-sqf-of-office-space-leased-at-bishop-ranch-in-san-ramon/.
[18] https://www.missionbaytma.org/wp-content/uploads/Mission-Bay-2017-Annual-Report-draft2.pdf.
[19] Page 5: https://www.missionbaytma.org/wp-content/uploads/Mission-Bay-2017-Annual-Report-draft2.pdf.
[20] Population estimate for July 1, 2018 and employment estimate for 2016, both rounded to nearest thousand: https://www.census.gov/quickfacts/sanmateocountycalifornia.
[21] Page 73: https://www.paloaltoonline.com/news/reports/1571414950.pdf.
[22] https://facts.stanford.edu/.
[23] https://facts.stanford.edu/administration/.
[24] Reported for Stanford University alone: https://gup.sites.stanford.edu/transportation.
[25] Population estimate for July 1, 2018, rounded to nearest thousand: https://www.census.gov/quickfacts/mountainviewcitycalifornia.
[26] SPUR analysis of 2017 US Census Bureau LEHD LODES data.
[27] Page 98: https://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=15038.

A seemingly effective but far less popular element of employer-based programs is to use a stick instead of a carrot, either putting restrictions on the number of parking spaces offered to employees or charging for parking. Large institutions such as Stanford and UC Berkeley do charge faculty, employees and students to park on campus, but they are the exception to a rule of largely abundant, free parking.

There is evidence that points to how reducing parking supply and charging for it could effectively limit drive-alone commutes. For example, surveys of San Francisco commuters showed that for those with free parking, 75% drove alone while for those without, only 37% did.[28] A recent study of parking pricing across California found that a 10% increase in parking prices would reduce drive-alone rates by one to two percent.[29] The lower response to price across the state reflects that in San Francisco, transit is a real substitute for driving. Not surprisingly, in metro areas across the United States, other researchers find that commuters are more likely to respond to parking pricing and other incentives when transit is perceived as a viable alternative to driving.[30]

In addition to having an effect on drive-alone rates, charging for parking affords employers a stream of revenue to pay for parking cash-out and other commuter benefits. For employers with a large or growing number of employees, parking cash-out and other incentives are likely cost prohibitive without some kind of parking charge.

Despite the fiscal sustainability that parking charges can provide in parking cash-out programs, and the evidence that parking charges can help reduce drive-alone rates, most employers don't charge for parking. As discussed in interviews and workshops with Bay Area employers, there are multiple reasons why this is the case today. It's important to note that while they are real, given enough time, thought and effort these barriers could be overcome.

Reasons Bay Area employers don't typically charge for parking[31]

Competition for workers. As discussed above, employers compete for the well-paid knowledge workers that make their businesses, operations and missions possible. Employers generally feel that charging for parking when other employers don't will limit their ability to attract talented employees. In addition, free parking has been ubiquitous among Bay Area employers for decades. An employer charging for parking risks standing out as punitive in a competitive recruitment and retention environment.

Bargaining agreements. Many employers, especially public agencies, have often agreed to free parking in collective bargaining agreements with unions. Opening the prospect of charging for parking would require labor contract negotiations, which would complicate the issues and positions at the bargaining table and compete for time among human resource departments' other priorities.

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[28] SFMTA, 2014. SFPark, Putting Theory into Practice: Pilot Project Summary and Lessons Learned. Based on 2005 survey data: http://sfpark.org/wp-content/uploads/2014/06/SFpark_Pilot_Summary.pdf.

[29] Nagwa Khordagui, 2019. Commute Mode Choice, Parking Policies, and Social Influence. Chapter 1: https://escholarship.org/content/qt07z507xf/qt07z507xf.pdf?t=puddbf.

[30] Allen Greenberg et al, 2017. Webinar: Transportation Benefits of Parking Cash-Out, Pre-TaxCommuter Benefits, and Parking Surtaxes https://pdfs.semanticscholar.org/73f0/96c0de2621c8cc2175ce06d3ca7efe3b1ad1.pdf.

[31] SPUR convened groups of employers throughout its monthly Transportation Pricing Task Force meetings from June through October 2019 and at a workshop dedicated to discussing employer barriers in parking pricing and cash-out on September 26, 2019.

(While cumbersome, this is not impossible. The City and County of San Francisco did renegotiate labor contracts and eliminate free parking for employees as the start of its SFPark program in 2010.[32])

Lease agreements. While some Bay Area employers own or even build their own buildings and campuses, most lease their worksites, and parking is often bundled into the lease already. Parking is also often managed by the property owner instead of the employer. Both bundled leases and lack of property management make it more difficult, and at times not possible, for employers to implement parking charges for employees.

The logistics of collecting parking charges. Many agencies and companies offer parking to customers or for fleet operations alongside employee parking. As such, charging for employee parking can often mean rethinking entire parking operations and management. In addition, the initial planning and capital needed to set up gates and payment infrastructure limits employers' ability to charge for parking and enforce parking rules.

Enforcement challenges. Employers face challenges in enforcing parking charges, maintaining dedicated parking for vanpools or carpools, and preventing cheating in trip planning apps. For small and medium-sized employers, dedicating staff time to enforcement is hard to justify given other competing priorities. Perhaps even more important, the first priority for employers of all sizes is to get their employees to work. Penalizing workers who don't pay a parking charge or park incorrectly is generally perceived as bad for morale and productivity.

Carrots versus sticks. Employers and policymakers alike find it politically much easier to offer commuters cash, subsidies and direct transit service than to charge drivers to park.

While these barriers are numerous and real, the potential benefits of charging for parking can be substantial to employers as well. For example, some estimate that each space in a parking structure costs roughly $33,000 in construction and soft costs such as architectural and legal fees.[33] The land value of parking varies, but is very high for all kinds of development in the Bay Area. In addition, operating parking facilities can carry costs such as insurance, landscaping, maintenance, property taxes or rent, security, utilities and more. Employers that plan, own and build their own parking structures are well aware of the cost new parking structures, and may be more likely to charge for parking, or dedicate resources to encourage their employees out of drive-alone commutes, just to avoid the cost building and maintaining parking.

The decision for employers to charge for parking requires considering avoiding all these costs and getting parking revenue, against the cost of overcoming the long list of barriers above. It also involves weighing parking charges against incentives alone. For the FVC pilots, it was not worth charging for parking in the near-term.

Policymakers and public policy also influence the costs and benefits employers face in deciding whether or not to offer commute incentives and/or to charge for parking. Unlike employers, policymakers' role is to consider the costs and benefits to society — in the form of congestion or emissions — as opposed to

[32] SFMTA, 2014. SFPark, Putting Theory into Practice: Pilot Project Summary and Lessons Learned Page 38: http://sfpark.org/wp-content/uploads/2014/06/SFpark_Pilot_Overview.pdf.
[33] https://wginc.com/parking-outlook/

one particular employer and set of employees. The section below illustrates how policy has set the context for employer efforts to encourage workers out of drive-alone commutes. It also offers context as to how the FVC pilots fit into existing policy efforts.

4. Commuter Benefits, Regulations and Laws

Over the past few decades, various regulations, laws and voluntary efforts have directed or influenced how Bay Area employers encourage their workers to commute. Some policies and programs have sought to encourage employers to shift their workers out of drive-alone commutes, while a couple have sought to limit policymakers' influence over commute choice. In addition, voluntary efforts have arisen between regulations and laws to test parking cash-out. This history and context offers clues about the degree to which FVC pilots might also shift workers out of drive-alone commutes while they are in place, as well as how future public policy may best support and help scale the innovations and benefits of the FVC pilot programs.

Figure 6. The FVC pilot project comes after numerous laws, regulations and past efforts to shape drive-alone commute patterns through employer-based benefits and programs

Listed in chronological order, this table summarizes key laws, regulations and voluntary efforts that like the FVC pilot, shape how commuters get to work. While the effect of these efforts on drive-alone commute rates has been studied in some cases, evaluation of the FVC pilots could offer more insight and understanding to employers and policymakers alike.

Policy or program	Date created	Type of policy or program	Description	Effects on drive-alone behavior
CA parking cash-out law (AB 2109)	1992	California law	Applies to employers of 50 or more, mandates that commuters who do not drive alone get benefits or cash in lieu of subsidized parking provided to drivers.	Across eight employer sites in Southern California, drive-alone commute rates dropped an average of 17% right after this law took effect. [34]
Trip Reduction Requirements (Air District Regulation 13-1)	1992	Bay Area regulation	For different zones in the Bay Area, sets a minimum number of carpoolers per car for each employer, and escalates the minimum over time.[35]	Unknown
Qualified Commuter Credit (SB 437)	1995	California law	Essentially undid the Bay Area's trip reduction requirements and made it illegal for the state to mandate commute carpool rates.	Unknown
Alameda County Parking Cash-Out Pilots	Late 1990s	Parking cash-out pilots	Established four public sector employers that offered parking cash-out ranging from $1.25 per trip, $1.50 to $2.00 per day, or $40 per month.	The percentages of commuters not driving alone went from 3%–5% to 19%–23% among pilot participants.[36]

[34] Donald Shoup, September 1997, Evaluating the effects of parking cash-out: eight case studies. https://ww3.arb.ca.gov/research/single-project.php?row_id=55468.

[35] https://ww3.arb.ca.gov/drdb/ba/curhtml/r13-1.htm.

[36] Page 18: https://www.alamedactc.org/wp-content/uploads/2018/12/ALAMEDA-TDM-Strategy_final.pdf?x33781.

San Francisco Commuter Benefits Ordinance	**2009**	**City commuter benefit ordinance**	**Requires employers with 20 or more employees to offer a pre-tax benefit; monthly subsidy for transit, vanpool or carpool; or employer-provided transit.**	**Unknown**
Bay Area Commuter Benefits Ordinance (SB 1339, SB 1128)	2013	Region wide commuter benefit ordinance	Requires the same benefits as the San Francisco Ordinance above, but applies only to employers of 50 or more.	Unknown
Federal Tax Cuts and Jobs Act	2017	Federal tax law	Makes all employer-provided commute benefits taxable.	Unknown
FVC parking cash-out pilots	2018	Parking cash-out pilots	Establishes parking cash-out pilots at four public sector employers in Silicon Valley. Uses a combination of incentives and benefit and trip tracking and planning software.	Not yet evaluated

Parking Cash-Out and Trip Caps in California

In 1992, California passed AB 2109 to require California employers with 50 or more employees that offer free parking to also provide a cash payment or subsidy to employees who do not drive. For employers to offer cash in lieu of free parking, the parking they provide must be unbundled from their building lease, and they must be able to calculate the daily subsidy given to employees in the form a free parking space. Given all these stipulations, and that the law is "self-implementing,"[37] the percentage of California employers who do comply with it is likely relatively small. However, through case studies of eight Southern California employers who began complying with the law, researchers estimated that in the near term, drive-alone rates went down by 17%, parking use dropped by 11%, and carpooling, transit and active modes (walking and biking) went up by 64%, 50% and 33% respectively.[38]

Also in 1992, the Bay Area began its Trip Reduction Requirements for Large Employers. This policy essentially put a cap on the number of vehicles that could arrive to each employer site in a given hour or day — also often called a "trip cap." For different zones in the Bay Area, the Trip Reduction Requirement set a minimum number of carpoolers per car for each employer, and escalated the minimum over time.[39] The targets didn't mean everyone had to carpool, just that a minimum percentage did. However, just three years after the Bay Area began its Trip Reduction Requirements, California passed SB 437, which prohibits the state from mandating trip caps for employers.[40]

However, SB 437 does not apply to cities or employers that opt to set their own trip caps, and there are different examples of trip caps at Stanford University, in Mountain View's North Bayshore area, and in the Bayfront area of Menlo Park. Stanford's has been set up as a condition of its General Use Permit:

[37] Page 7: https://ww3.arb.ca.gov/planning/tsaq/cashout/cashout_guide_0809.pdf.
[38] Donald Shoup, September 1997, Evaluating the effects of parking cash-out: eight case studies. https://ww3.arb.ca.gov/research/single-project.php?row_id=55468.
[39] https://ww3.arb.ca.gov/drdb/ba/curhtml/r13-1.htm.
[40] http://leginfo.ca.gov/pub/95-96/bill/sen/sb_0401-0450/sb_437_cfa_950828_150028_asm_comm.html.

The university cannot add any more commute trips during peak hours as it adds more buildings to its campus. Along with a suite of TDM policies — such as parking management, free shuttles to Caltrain stations, a Commute Club, biking amenities and more — the campus has seen its drive-alone rate fall from 69% to 43% between 2003 and 2017.[41] The North Bayshore precise plan in Mountain View sets a district-wide target of no more than 45% drive-alone trips and a limit of 18,000 vehicle trips in the morning peak period (7 to 10 a.m.) at its three entry points combined.[42] If the employers in the precise plan area do not meet the trip cap, they may have to adopt additional TDM strategies, pay fines or be subject to congestion charging.[43] Menlo Park's trip caps are set for different areas within the Bayfront area for different hours of the day, but there is also a total daily maximum as well.[44]

In all cases, the areas with trip caps are popular destinations at peak hours and the programs have defined enough entry points that the vehicles entering the area can be accurately counted. A simple but profound conclusion can be drawn from these policies. When a policy includes a measurable target for drive-alone commute rates, especially with real enforcement, drive-alone rates can be accurately tracked. With commuter benefits and tax policies, it is hard — at times impossible — to measure whether the policies are shifting commuter behavior, how many commuters they shift, whether or not shifts in behavior are temporary reactions or lasting changes, and how overall street and transit patterns are affected.

Measuring and monitoring commute trips can perhaps also be accomplished through the RideAmigos voluntary trip tacking feature available through the FVC pilots.

Regional Commuter Benefits

Another set of important regulations is commuter benefit ordinances. San Francisco led the charge by establishing its ordinance in 2009.[45] The Bay Area's Regional Commute Benefits Ordinance was created as a pilot by SB 1339 in 2013 and made permanent by SB 1128 in 2016.[46] Both the San Francisco and regional ordinances require employers of a certain size (20 employees in San Francisco and 50 across the region) to offer one of four commute benefits: a pre-tax benefit for transit or vanpool, a monthly transit or carpool subsidy, employer-provided transit or any combination of these.[47] Unlike the California parking cash-out law, these benefits must be provided regardless of whether or not employers provide subsidized parking.

Outreach to employers for the regional commute benefits ordinance is done through the Metropolitan Transportation Commission (MTC), and employers submit an annual form that lists the benefit they are offering. Enforcement of the ordinance is handled by the Bay Area Air Quality Management District (BAAQMD), as it was set up as an air pollution management policy. Enforcement is made difficult by the

[41] https://gup.sites.stanford.edu/transportation.
[42] Page 98: https://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=15038.
[43] Page 183: https://www.mountainview.gov/civicax/filebank/blobdload.aspx?BlobID=15038.
[44] https://www.menlopark.org/DocumentCenter/View/16592/F4---1-Hacker-Way-Facebook-East-Campus-DA-and-CDP-Amendments-Final-Draft?bidId=.
[45] In addition, cities like Berkeley have also established even wider reaching commuter benefits requirements for employers of 10 or more employees.
[46] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1128.
[47] The regional program will also accept reviewed alternatives offered directly or through a TMA. www.baaqmd.gov/~/media/files/planning-and-research/commuter-benefits-program/proposed-rule-packet/proposed-rule-reg-141.pdf?la=en.

fact that BAAQMD staff do not have access to complete records that list the employer size, exact location and contact information for all employers throughout the Bay Area.

Incentives tested in the FVC pilots could help inform whether or not additional employer-provided benefits should qualify as compliance measures under Bay Area Commuter Benefit Ordinance. In addition, a more widespread use of platforms like RideAmigos, along with data sharing agreements between employers and BAAQMD, could help with enforcement of the Bay Area Commuter Benefits Ordinance.

Federal Commuter Benefits Tax Policy

The federal policy that throws all employer benefits into some question is the 2017 Federal Tax Cuts and Jobs Act and the accompanying IRS guidance on it. Prior to these, private and nonprofit employers could write off parking and transit pass benefits provided to employees, effectively lowering their overall tax burden. Now, benefits provided in terms of parking and transit will be taxable at the employer level, as will bike and active mode improvements at employer sites.

Some have argued that because many companies received other large tax breaks as part of the 2017 law, they can afford to pay more for commuter benefits now. However, it is not at all mandatory that most US employers continue to provide commuter benefits, and they still face a choice in which providing them is less beneficial than it was before. Regardless of other tax breaks, the incentive to provide all kinds of commuter benefits has diminished and doing so is now more expensive.[48] Left unclear is how employers will respond to these increased costs. Will they cut benefits where they can? Will they pass the costs on to employees in some form? And most of all, how will employer offerings change the way people commute to work, and what effects will they have on transit ridership, road congestion, emissions, equity and more? In the Bay Area, where employers with 50 or more employees must comply with Bay Area Commuter Benefits Ordinance, they may continue to offer transit and other benefits at the higher tax cost, while those not subject to it may choose to cut benefits. From a commuter's perspective, eliminating pre-tax transit passes would effectively be a 25% fare increase and could have significant ramifications.[49]

Voluntary Parking Cash-Out Pilots

Over time, there have also been a few Bay Area pilots that have sought to test and demonstrate how parking cash-out programs would function operationally, as well as how they would help shift people out of drive-alone commutes. In the late 1990s, the Alameda County Transportation Commission set up parking cash-out pilots with four public sector employers: the County of Alameda and the cities of Albany, Pleasanton and Oakland. All employers offered cash in lieu of parking, ranging from $1.25 per trip, $1.50 to $2.00 per day, or $40 in commuter checks. The percentages of people who did not drive alone were 3% to 5% where there was no incentive and moved to 19% to 23% among pilot participants.[50]

[48] The actual amount could vary. For example, IRS guidance to calculate the liability of providing parking could leave employers with tax liabilities anywhere between the full cost of providing parking, down to nothing at all. The amount of liability depends on how much parking is provided for employee parking (and no other use) and cost of operating it. https://www.bestworkplaces.org/wp-content/uploads/2019/02/Parking-Expenses-2-18-19.pdf.

[49] Page 2: http://library.rpa.org/pdf/RPA_Commuter_Benefits_Tax_Policy.pdf.

[50] Page 18: https://www.alamedactc.org/wp-content/uploads/2018/12/ALAMEDA-TDM-Strategy_final.pdf?x33781.

Lessons Learned

Across these laws, regulations and voluntary efforts, a few insights can be drawn.

First, as seen in the last column of Figure 6, measurement of the direct effect of these various efforts on drive-alone commute rates is difficult to come by. This is largely due to a lack of readily available data on commute patterns at a fine enough geography (e.g., for each employer site). To evaluate the effect of various efforts on drive-alone commute rates, careful evaluation design has to be built into laws and programs. Another option is that measurement has to be a central tenant of the effort — as is the case with enforceable trip caps that mandate, track and enforce the maximum percentage of drive-alone commutes allowed to particular destinations.

The FVC pilot program's evaluation effort may help shed more light on how these efforts affect drive-alone commuting behavior, particularly when paired with mobility on demand software, which is a new innovation among the Bay Area parking cash-out pilots discussed above. In addition, participants in the FVC commuter pilot programs have the option to track commutes directly in the RideAmigos app. Establishing trip tracking as the default setting, or encouraging commuters to track trips, can help create more data. If enough commuters track trips, and data can be anonymized and shared for research purposes, policymakers could assess and better tailor commuter benefit policies to reduce overall congestion, emissions and other externalities associated with drive-alone commutes.

Second, where measurable results are available, it appears that incentives work to shift some employees out of drive-alone commutes. This can be seen from studies that examined the immediate response to the California Parking Cash-Out Law and the parking cash-out pilots in Alameda County. This is promising and makes it reasonable to expect that the FVC pilots will also have a real effect on commuter behavior.

Third, recent changes to the federal tax law and the law that limits the state's ability to mandate trip cap (SB 437) bring to the fore how important employer-provided commuter benefits could be in the push to reduce drive-alone commute rates. The federal tax cuts beg the question of whether or not more people would drive if employers limit transit commuter benefits, and what that would do to roadways, congestion and emissions from cars. The fact that SB 437 prohibits the state from setting trip caps makes it all the more important that cities, regions and employers work together to enact these policies where they make sense.

Lastly, parking cash-out efforts at employer sites are important in proving the concept and testing the operations of incentives. The pilot hosts for the FVC project also shared that gathering and distilling their policies for display in the commuter wallet helped them organize and communicate commuter benefits in a more effective and user-friendly way than ever before. Combined with the ability to offer commute competitions through the RideAmigos platform, the pilots also helped employers raise awareness about alternatives to driving to work alone, both among pilot project staff and employees in general. The commuter behavior data provided by RideAmigos dashboards also helped employers support decisions to make commute incentives a priority at employer sites.

On the other hand, some FVC pilot employers interviewed for this paper remarked on the difficulty of the pilot programs' short-term nature. Pilots require setting up new systems and dedicating staff time to managing new projects, only to time out, often because funding for the pilot is not reauthorized. This limits the pilots' effectiveness in appealing to wider groups of employees and creating lasting change in

commute habits. However, broader public policy can help scale pilot programs over time and across employer sites. Public policies that build on existing knowledge, laws and regulatory efforts, can help employers scale and continue the innovations coming out of the FVC pilots, which will help ease congestion and clean the region's air.

5. Policies for Scaling Up Employer-Based Pilot Programs

There are several policies that could help leverage the early lessons learned from the FVC pilot programs, help expand them and further reduce drive-alone commutes in the region.

In general, while employers have a unique role to play in reducing drive-alone rates — they have more information about commute options and how employers respond to commute benefit incentives than policymakers — there is also a natural limit to what they can achieve on their own. For one, the benefits of the pilots are likely to end if employers choose not to keep funding parking cash-out programs and other incentives. There are also feedback effects to consider. As individual employers successfully move commuters out of drive-alone commute trips, they free up capacity on highways and streets, which can simply make it easier for other drivers to take more car trips, in effect encouraging more driving. While there is no substitute for lessons learned from pilots and actions taken by employers, there is also no substitute for policies that level the playing field across all travelers.

Employers' experiences at pilot sites suggest that regional policy can in some ways be more promising than city and county policy. Employer sites in the FVC program agree that recruiting and maintaining talented workers means competing with employers across the region. Policies that codify elements of the FVC pilots and require employers to offer more incentives, or to charge for parking at the city or county scale, may only shift where people choose to work, as opposed to lowering drive-alone commute rates. Because of this, Section 5 focuses first on policies to help scale the FVC pilot programs at a regional level.

In addition, employers in the FVC pilots had difficulty charging for parking. Regional policies that draw from and support the FVC pilots could take one of two broad forms — one that scales incentives to commuters who do not drive alone (carrots) or one that imposes parking charges (sticks). In other words, Bay Area policy makers could:

- Create a regional TDM program, and/or
- Create a regional baseline parking charge for employers

It is also worth noting that there is always the option of living with the status quo — a choice we make by taking no action.

Additional supporting policies might be needed to complement any regional effort. These include creating a regional database of parking of all kinds, coordinating regional support for cities to enact parking policies in tandem with employers, furthering work to create open payment platforms to streamline commuter incentives, and continuing the ongoing work of policymakers to make seamless regional transit competitive with driving.

Regional option 1: Establish minimum regional parking charges at employer sites.

In interviews with Bay Area employers, including those participating in the FVC pilot program, it became clear that no one employer is likely to begin charging for parking on their own. The barriers are too many and the concern that parking charges would deter talented workers is too great a risk. On the other hand, the continuation of any FVC pilot efforts after 2019 may require funding, which parking charges could provide. Parking charges could also help further shift commuters into carpooling, transit, biking and walking and bring down congestion, emissions and safety threats from cars. To bridge the gap between what employers or individual cities can effectively pioneer and the potential benefits of parking charges, the Bay Area could establish a policy that employers over a certain size charge a daily minimum for the parking they provide. This could also extend to property managers that supply parking for large employers.

There are many important policy features to consider in creating a minimum parking price for employers: how to phase in such a policy over time, what the minimum size employer should be, what the minimum charge should be, how to make the charge equitable and fair for employees of all incomes and employers of all sizes, how to collect and enforce parking charges and how to reinvest revenues. In addition, policymakers would need to solve for unintended consequences: how to dissuade drivers from parking on unpriced streets or choosing single-occupancy ride-hailing services instead of driving. Lastly, policymakers would need to decide which agencies would ultimately be responsible for administering and enforcing the program.

<u>How to phase in a regional baseline parking charge over time</u>

The FVC project highlights important implementation lessons — the barriers employers face in charging for parking, the value of having a commuter wallet to better communicate commute benefits across employees and more. Because charging for parking at employer sites is so rare today, pilots that test how the parking charges could be implemented, and how commuters respond to them, would be invaluable. A regional parking charge could begin with a pilot phase and could help answer the following questions:

- **The right parking price(s).** At what parking price would employees decide to switch from driving alone to carpooling or another mode? Are employees of different income levels more responsive at different price points?
- **City-employer collaboration**. How would pricing parking at large employer sites affect where commuters park? Would they continue to drive but park in neighborhoods or at other free curb space? How could cities and employers coordinate on parking policy to avoid this?
- **Equity across people of different incomes**. Recognizing that some workers cannot absorb parking charges, how can employers (and cities) identify lower-income workers and either waive their parking charges or refund them?
- **Effective implementation**. Pilots are a great way to test policy implementation. How should policymakers design the following to ensure effectiveness at a reasonable cost: communication of the policy to commuters, ease of payment, monitoring of drive-alone rates and enforcement of parking charges?

Pilots to charge for parking could begin at employment districts, similar to the scale at which TMAs are organized. They could continue and extend to the region as these questions are answered and other

lessons are learned. In addition, such pilots could prove and make tangible any benefits to charging for parking at employer sites. In general, the out-of-pocket costs and barriers are far more personal and real for drivers and employers than the society-wide benefits of reduced congestion, saved time and improved air quality from parking charges. Making benefits more real could help make parking charges more politically viable.

Who would a regional baseline parking charge apply to?

Regarding employer size, there are three examples to choose from. The San Francisco Commute Benefit Ordinance sets the minimum at 20 employees, though given the city's unique transit richness, this is likely too low for the entire nine-county Bay Area. The minimum could start at 50 employees, equivalent to that in the Bay Area Commute Benefits Ordinance, or it could start at 100, as Seattle's Commute Trip Reduction Program does.[51] In any case, smaller employers could be included as part of a TMA that can help streamline and scale the administration of parking charges across multiple employers in the same area (see supporting policy idea 2 below). In addition, parking charges could be limited to employers along corridors or arterials that are critically congested or to employers that meet a certain job density requirement.

How much should the charge be?

The amount of the charge could start as small and simple as a dollar a day. What may matter more in changing drive-alone parking rates is not the actual amount of the charge but having a visible charge at all.[52] If more is gleaned from parking charging pilots about the price that is optimal to shift drive-alone commuters, then the price could be adjusted. In addition, making parking charges daily (as opposed to monthly) could be important in influencing commute choice. For example, once a parking permit is paid for a month or year, drivers have no incentive to take other options on the days when it is possible. For lower- or middle-income travelers, smaller, more frequent charges are often easier to pay. A daily charge would be better for these populations. To further address equity, charges could be waived or lowered for low-income workers. To avoid burdening low-wage workers who hold multiple jobs with the task of documenting total income, workers making less than a certain amount at any one employer could quality for the free or discounted parking charges across all parking sites.

Who would administer this policy?

Because MTC and BAAQMD already administer the Bay Area Commute Benefits Ordinance, they could be the agencies to continue to provide outreach to companies (already done by MTC) and enforcement of a regional employer parking charge (the responsibility of BAAQMD). A portion of the parking revenues could go to these agencies to cover additional administrative costs.

How would this policy be implemented?

Plans for administering parking charges would require careful consideration. Employers or property managers of leased parking could install standard parking infrastructure to manage parking, such as

[51] Page 2: https://www.seattle.gov/Documents/Departments/SDOT/TransportationOptionsProgram/CTR_Final_Plan_20190822.pdf.

[52] In an evaluation of price-based incentives in Alameda County in the 1990's1990s, it was found that any incentive was more effective than the amount itself. ACTC, 2013 Countywide TDM Strategy, Page 18: https://www.alamedactc.org/wp-content/uploads/2018/12/ALAMEDA-TDM-Strategy_final.pdf?x33781.

parking gates and payment machines. Another option is to bypass these altogether and rely on an app-based system that charges workers a dollar for each day they do not verify that they rode transit, took a carpool or used another alternative to driving alone. With a functioning ECTR and commuter wallet like the ones being piloted in the FVC demonstration, this could be easier and cheaper to set up than gates and payment machines. From an equity perspective, making sure that unbanked workers could top up their accounts at common retailers would be key. In addition, where possible, TMAs could take responsibility for streamlining the set up and operations of the ECTR software across employers. One possibility would be to charge the daily parking charge on scheduled work days unless a drive-alone alternative was documented. This would ease the need for parking enforcement in garages and lots, as well. One tricky part of this approach would be establishing what is a working day for employees with irregular schedules and adjusting the default schedule when time off is taken.

How would the revenues be used?

The political pathway to creating a regional parking charge may depend on how revenues are dedicated. If all revenues from the charges were spent on employee transit and drive-alone alternative benefits, then they may be considered a "fee" under California's Proposition 26. In this case, the program could move forward without a two-thirds vote in the California legislature. If, however, the revenues from the parking charges were used for a general purpose, they may be considered a "tax," which *would* require a two-thirds majority approval in the state legislature. The option of recycling revenues back to workers in the form of cash-out and other benefits is not only politically easier but more equitable. Giving money back to workers helps lower-income workers more than higher-income workers. Employees should be given the option to choose the benefit (cash versus transit pass) that helps them the most. This kind of choice would allow low-income workers much needed flexibility in tight budgets.

How would policymakers mitigate unintended consequences?

There are two important unintended consequences of putting a new price on employer parking.

The first is the potential for employees to simply park in neighborhoods and at other free curb spaces. Employers and cities would need to work together to either begin to price some parts of their jurisdictions or set up time limits and permits for residents in the areas likely to be affected. It's also worth noting that as part of their study of downtown Palo Alto, the FVC team found that minimum-wage baristas and restaurant workers are parking in spaces with two-hour time limits and moving their cars multiple times per shift. When they cannot move their cars, they risk getting expensive tickets. Compared to getting tickets, paying a parking charge at a city-controlled kiosk or meter may actually help make such workers better off. This would especially be the case if low-income workers were charged a lower rate by cities as well as employers.

Second, in suburban areas where transit alternatives to driving alone are not common, employer parking charges may simply encourage workers to take more Uber or Lyft rides alone. To drop off and pick up one worker, a ride-hail driver would make four trips, as opposed to the two that a single-occupancy driver would make. One potential way to get around this doubling of trips is to stipulate that ride hail commute trips would only qualify as an alternative to driving alone if they were shared and if the car was occupied by more than one passenger for more than half of each trip. Since these details are already tracked in ride hail apps, no new information would need to be gathered; existing data would simply need to be shared across an ECTR platform.

Regional option 2: Create a minimum regional TDM mandate.

While parking charges crate a clear disincentive to drive alone, TDM measures create positive incentives for options other than driving alone. While these are generally politically more feasible, they can also create unfunded mandates — rules that require employers and agencies to raise new money to keep the programs going.

A minimum regional TDM mandate would be similar to the Bay Area Commuter Benefit Ordinance in that it would require employers or TMAs to establish a set of strategies and offerings to encourage employees out of drive-alone commute trips. However, it would be different in that it could: expand and test the list of possible measures beyond current commuter benefits offerings; use newer tools like those piloted in the FVC program; and include stronger verification and enforcement mechanisms.

Which employers would the policy apply to?

The criteria for compliance could continue to be based on employer size, as in the above option on parking charges. Similarly, the size limit could stay at 50, be ramped down to 20 as is done in San Francisco, or up to 100 as is done in Seattle. In any case, smaller employers could be included as part of a TMA that can help streamline TDM offerings and administration across multiple employers in the same area.

Which TDM measures would qualify?

As listed in the sidebar, there are numerous examples of TMAs and TDM policies and practices in the Bay Area. Policymakers could draw from these to create a set of TDM options that would qualify toward the regional mandate. San Francisco's point-based menu of TDM measures that employers can choose from is a particularly helpful example.[53] So long as employers or TMAs reach a certain point total, they could meet the TDM mandate in whatever way best suits their particular context. It is worth noting that a regional TDM mandate could include the option for employers to charge for parking but given the competition among employers to attract talent though transportation benefits, it is unlikely employers will opt to charge for parking.

How would verification and enforcement work?

Employers could comply with the new mandate by reporting to MTC on an annual basis about the TDM measures they are taking. However, with trip tracking platforms like RideAmigos, reporting could be made simpler and more frequent. Data sharing agreements could be set up to automatically send each employer's monthly average commute mode share to MTC. Employer size, location (whether headquarters are in the Bay Area or not) and contact information could also be shared with BAAQMD. With these data more readily available, the agency could enforce the new regional TDM mandate more easily than it can enforce the current ordinance today. BAAQMD could also bolster enforcement through dedicating staff to site visits to verify reported TDM measures. This could be done on an audit basis, so that not every employer needs to be verified every year. In addition, penalties for non-compliance could be set. These could be similar to those listed in the San Francisco Commuter Benefit Ordinance and could include fines for the number of days an employer is not in compliance.[54] Additional regional

[53] Pages 12-14: https://default.sfplanning.org/transportation/tdm/TDM_Program_Standards.pdf.
[54] https://sfenvironment.org/commuter-benefits-ordinance-sf.

revenues may need to be raised to cover the increased administrative costs of verification and enforcement.

Supporting policies

There are six policies that could support broader regional efforts to reduce drive-alone commute rates. These supporting policies would be critical under either a minimum regional parking charge at employer sites, a regional TDM program or both.

Supporting policy 1: Trip monitoring systems for key employment centers

Policy will better serve the overall goal of reducing drive-alone commute rates and scaling innovative FVC efforts if trips to key job centers are better monitored. Major job centers could be defined as areas that have 50 or more jobs per acre (as seen in Figure 3) and have well-defined entry points where trips made during peak commute hours can be easily tracked. Low-cost car tracking devices could be put in place at these entry points to help track, monitor and evaluate parking pricing, cash-out or TDM efforts. These could either be completely anonymous to protect privacy or, like toll gates, could be allowed to track license plate numbers and registered vehicle owners. In addition, data collected through software like RideAmigos in the FVC pilots could help monitor overall driving rates if enough travelers use such platforms. The collection, standardization and public sharing of the data could be done at a regional scale by MTC.

Supporting policy 2: A regional parking database

A standardized inventory of employer, public and private parking does not currently exist but could go a long way to inform the design of parking pilots and charges, coordinate charges across different parking providers, serve as an input for policy evaluation, and offer employers and drivers better information about driving and parking options.

The Bay Area has several examples of parking inventories. For its SFPark pilot program, San Francisco undertook a parking census — an inventorying of all public parking in the city — as the first step in designing parking rates to help drivers better access businesses and ensure that spaces were available on every block at any given time. In a similar effort, known as goBerkeley, the City of Berkeley undertook a scaled-back approach to understanding its parking inventory and use. The nonprofit organization TransForm conducted a study of parking space usage at a sample of residential buildings across the Bay Area. The group's GreenTRIP Parking Database helped illuminate that nearly $2 million has been spent at just 80 residential buildings constructing parking spaces that go largely unused.[55] While all these inventories have been large efforts, other low-cost innovations should be considered, such as estimating parking supply and location through the use of satellite imagery and machine learning, efforts to crowd source and verify data (as Open Street Maps does) and more.

In addition to collecting data on parking, a policy framework for standardizing data collection and sharing across various parties would need to be set. MTC could serve as the agency to coordinate the creation and vetting of such a framework. Once in place, open application program interfaces (APIs) — a set of rules and protocols that allows the integration of different data sources, software applications and websites — could facilitate the use of parking data across multiple platforms. For example, travelers

[55] http://database.greentrip.org/.

could begin to see parking options and prices in trip planning apps like Google Maps. Employers, TMAs and policymakers could leverage insights from parking data and usage rates to assess how well drive-alone parking charges and other incentives were working, and much more.

Supporting policy 3: Broader TDM programs that can support smaller employers

Smaller employers typically don't have the same level of staffing and resources to devote to developing TDM policies and programs, engaging in pilot efforts or exploring new ways to charge for parking. Many of these employers in the Bay Area are not currently members of a larger TMA that could help provide them with these resources.

To help scale TDM and parking pricing options across these employers, outreach to their employees could be streamlined under broader TMA efforts. In San Mateo County for example, Commute.org provides a platform and incentives for any worker in the county. Such commuters can enroll in challenges and become eligible for prizes when they choose to drive alone to work less often. MTC could expand its outreach role under the Bay Area Commuter Benefits Ordinance and help small employers take more advantage of such programs. MTC could also provide the entire Bay Area with the kind of platform that Commute.org offers in San Mateo County. The agency could allow employees of small employers across the region to earn prizes by planning and tracking commute trips made using modes other than driving alone. MTC can also recommend different kinds of TDM measures that might make sense for groups of small employers clustered in distinct geographic areas and work with cities, CMAs and employers to help implement them.

Supporting policy 4: Support for city-led public parking charges

MTC is already working to establish a clearinghouse of information and offer technical assistance for cities interested in conducting parking studies and enacting parking charges. This work complements the FVC pilots and could continue to evolve and be bolstered in strategic ways. For example, outreach to the Bay Area's 101 cities is a heavy lift, and it may be beneficial to hire more staff at MTC to support this work. In addition, MTC could work to create standardized shortcuts for cities interested in moving forward with parking charges. These could include offering cities pre-vetted contract agreements with the vendors that provide parking pricing studies, technology installation or other services. Because finding and screening vendors and setting up contracts takes time, pre-vetted contract agreements could save cities time and money and perhaps make them more likely to move forward with parking charges. In places where charging for parking could lead workers to seek free spaces on city streets, this could be critical.

Supporting policy 5: Open payment platforms for parking and other transportation services

Right now, commuters have to pay for parking, transit, tolls and other transportation services through separate user accounts or methods. Parking charges are paid for at meters with cash or credit cards, transit fares can be paid using a Clipper card and in some cases cash, and tolls can be paid for through FasTrak account balances. This could be simplified from the user's perspective. All payments could flow through one account, and all of these services could be paid for using one-tap bank cards or a single smart phone app. The idea of a unified user account and payment system for all kinds of travel is often

called a mobility wallet. This builds off the idea of the FVC pilot program's commuter wallet software and adds banking and payment features on top of it.

In addition to the ease it would create for travelers, employers and policy makers could access the back end of this system to set rewards and offer incentives to support alternatives to drive-alone commuting. For example, through its mobility wallet TapForce, LAMetro is considering offering subsidies to drivers who complete a certain number of commute trips on transit in a given time period.

A Bay Area mobility wallet would require continuing work by transit agencies, MTC and the Clipper Executive Board to standardize fare policies across transit agencies and would benefit from lessons learned from the final FVC pilot program evaluation. It would also require establishing data and revenue sharing agreements with Bay Area tolling authorities and with parking vendors. Lastly, all of these entities would need to agree to open payment APIs and allow the banking and payment industry to manage payment transactions. Creating open APIs for payments would carry the added benefit of allowing tech companies to compete to make the best user-facing payment apps.

For people who don't have bank accounts, the ability to load cash into a mobility wallet at common retailers would be critical.

Lastly, while payments should be easy for travelers of all kinds across all transportation modes, it is important that the per-trip cost of driving alone (tolls, parking, etc.) be as obvious as the cost for transit, bike sharing or car sharing. The price signal of driving alone should not be hidden — otherwise it may not serve as a behavioral tool to help shift drive-alone commuters to other alternatives.

<u>Supporting policy 6: Regional transit and other alternatives to driving alone to work</u>

There are numerous efforts underway to provide faster and more reliable transit so that it can better compete with driving alone, especially in the suburban Silicon Valley context. One major improvement is the recent decision by Caltrain to increase train frequencies along the peninsula.

In addition, while some commute times and distances have been growing for workers, many still commute distances of just 5 miles or less. For this group of employees, driving alone is much faster than transit. This is a group for which biking and other active modes could be real drive-alone alternatives. Continuing city- and county-led investments in protected bike lanes and other bike, scooter and pedestrian infrastructure could go a long way in helping to encourage this group of travelers out of drive-alone commute patterns and would make it easier for employers to continue FVC pilot efforts.

Discussion of Policy Options: Consequences and Trade-Offs

The Bay Area is at a crossroads in terms of how to reduce drive-alone commutes and bring less-congested roads, greater access to more destinations, and improved safety, air quality and health to the region. The FVC experience points to the promise of regional strategies to help scale up FVC pilots, and there are many ways in which lessons learned from these pilots can help inform regional policy design. Overall, regional policy could set baseline employer parking charges and use the revenues to sustain employee incentives not to drive alone and/or could require region-wide TDM measures.

When considering such policies, it's important to evaluate not just their ability to reduce drive-alone commute rates, congestion and emissions, but also their equity implications, the political lift they require and whether or not they create revenue to reinvest. Figure 7 below highlights how each of the

regional policies might fare across these dimensions. Boxes are shaded red for a negative effect, yellow for a small or uncertain effect and green for a positive effect. The shadings are meant to be directional and relative, rather than precise.

As represented in the second column, both a minimum regional employer parking charge and a regional TDM mandate are likely to reduce drive-alone commute rates. In the third and fourth columns, the negative effects of drive-alone commutes — congestion and emissions — track with how much drive-alone commuting decreases. Each policy would bring down drive-alone commute rates in a different way and is context dependent. To drivers, a parking charge makes the cost of *all* other modes relatively cheaper than driving alone. In contrast, TDM measures make single alternatives faster or cheaper than driving alone. In a commute context with transit, biking, carpool and other alternatives to driving alone, a price on parking could make all of those other options more attractive all at once and could perhaps be the single most effective way to shift commuter behavior. In a context where driving and carpooling are the only options, creating alternatives through TDM measures — such as free shuttles to the nearest transit station — could be the most effective way to shift workers out of drive-alone commutes. Both are still strong regional policy ideas but are likely to have different effects in different places. This is one of the reasons parking charges could start with more pilots and why a roll out of a regional TDM mandate could rely on lessons learned from the FVC and other parking cash-out efforts.

The bigger differences between a regional employer parking charge and a regional TDM mandate are the revenues they raise and the political lift of each (columns five and six in Figure 7 below). Parking charges come with revenues to reinvest in further TDM measures, address equity concerns and more. In contrast, a regional TDM mandate would require employers to find another sustainable revenue source. Said another way, parking charges could cost less for each employee they shift out of drive-alone commutes. However, instituting parking charges is much more politically costly. Employers, drivers, and local and regional political leaders seeking reelection are all daunted by the task of charging for parking in places where it is almost ubiquitously free today.

In terms of equity, it is important to at least start with the status quo. Today's high drive-alone rates create a number of inequities. Emissions from cars degrade air quality and cause heart and respiratory disease in low-income communities and communities of color. Lower-wage workers often face higher penalties from congestion and delays in that they may lose a job if they are late, while tardiness is often not as consequential for higher-wage workers. Reducing drive-alone rates is likely to address some of these inequities, but the exact design of parking charges and TDM mandates would also determine whether or not they further erode or advance equity, particularly among low-wage workers. For example, any flat parking charge is likely to be inequitable in that lower-income workers would pay a higher percentage of their income on it. But if rates were set progressively, or some workers were made exempt, this wouldn't necessarily be the case. In addition, if some portion of revenues from parking charges were given back to all workers via cash-out for carpooling or other perks, these could disproportionately benefit lower-income workers. Because of all these considerations, the boxes in the last column are yellow, or uncertain. For either parking charges or TDM mandates, an equitable process and distinct equity outcomes will need to be designed for and ensured.

The one thing that is clearest is that no action — the status quo — is by far the easiest option but also the one that leaves Bay Area residents, workers and employers with the worst outcomes.

Figure 7. While the status quo is easiest politically, it comes with the most harmful effects.
Tradeoffs inherent in broad policy options to help scale employer-based parking pricing and cash-out
The boxes below are shaded red when a scenario is likely to have or continue a negative effect, yellow when it has a small or uncertain effect and green when it has a positive effect. These shadings are meant to show relative merits as opposed to precise measures.

Scenario	Drive-Alone Rates	Emissions	Traffic / Time Wasted	Revenues to Reinvest	Political Lift	Equity
Status quo	Continue to worsen	Continue to worsen	Continue to worsen	No revenue	Easy	Inequities remain
Minimum regional parking charges for employers	Likely to shift behavior but the amount is context dependent	Expected reduction in emissions from passenger cars	Expected lessening of congestion and lost time	Revenue to reinvest	Would require statewide legislation; unpopular for employers, drivers and locally elected policymakers	Reduction in pollution; Buses freed from traffic; charges could be inequitable if not income-based or offset
Minimum regional TDM mandate	Likely to shift behavior, but the amount is context dependent	Some expected reductions in emissions from passenger cars	Some expected reduction in congestion and lost time	No revenue	Would require new regional leadership; compliance difficult to enforce	Reduction in pollution; Buses freed from traffic; no extra burden on low-income drivers

7. Conclusion

The Bay Area's congestion, air quality and public health are suffering from too many drive-alone trips across a sprawling region. While residents, employers and workers have come to accept that this is part of everyday life, it doesn't have to be this way. The FVC pilot programs stand as a testament to the kinds of innovation that could help improve the quality of life in our region by bringing down drive-alone commute rates.

While not all the lessons from the FVC pilots could be captured at the time of this writing, the pilots shed light on how employers and policymakers can work together to reach the shared goal of reducing drive-alone rates. In particular, the information sharing, software and lessons learned about offering employer-based incentives versus charging for parking can all help shape how existing employers continue pilot efforts, whether or not other employers follow suit, and how policymakers can complement and further encourage such efforts.

Because employers cannot sacrifice any competitive edge in their pursuit to recruit and retain talented workers, policymakers must play the role of setting minimum rules. These minimum rules will have to be regional in nature to match the commute patterns of the Bay Area. They can take the form of parking charges, further incentives not to drive alone or both. In addition, supporting policies that allow for better monitoring of trips, data on parking supply and use, support for workers at small employers and

more, can all help further support and scale the efforts of the FVC pilots and achieve reduced drive-alone commute rates.

While there are various options and tradeoffs to consider with the policy ideas presented for discussion in this paper, one thing is clear. Any path forward will require a stronger focus on the common goal of reducing drive-alone commute rates than on the barriers to action. Leaders across companies, nonprofits and public agencies will need to work together to share information, test and pilot new ideas, and lead the implementation of strategies. Together such leadership can allow people to get to work in a way that doesn't clog roads or cost time, and that allows for clean air and safer streets across the Bay Area.

APPENDIX

14

Sustainable Transportation Waiver

Sustainable Transportation Fleet Application and Waiver

Overview

The City of Menlo Park is making City-owned bicycles, electric bicycles (e-bicycle), electric scooters (e-scooter), and a cargo tricycle available for use by City Employees for the following purposes:

- As a mode of transportation for conducting City business instead of using a Fleet or personally owned vehicle.
- As a mode of transportation for making personal, non-commute trips before, during, or after the workday (excluding cargo tricycle).
- As a one or two week rental period to assess viability of electric vehicles for City Employees' commute to/from work (e-bicycles and e-scooters only).

How Can I Participate?

In order to participate, you will need to:
(1) Complete the Sustainable Transportation Fleet Application Form
(2) Obtain your supervisor's endorsement and approval to participate in the Sustainable Transportation Fleet Program
(3) Submit the completed and endorsed Application Form to the City Transportation Division in person to the TDM Coordinator or via email to transportation@menlopark.org

The Transportation Division will process your form, and you will be sent a confirmation email that documents the completion of items 1 through 3, allowing you to ride a Sustainable Transportation Fleet vehicle.

Program Policies

City-owned bicycles, e-bicycles, e-scooters, and cargo tricycle must be used in accordance with the City's Administrative Policy - *Use of City Owned and Privately Owned Vehicles for City Business,* the *California Vehicle Code,* and all other applicable policies and regulations. An employee must not have any physical impediments or pre-existing medical conditions that prevent them from safely bicycling.

Per the *California Vehicle Code*, riders over the age of 18 are not required to wear helmets while operating a City bicycle, e-bicycle, or cargo tricycle. However, the City Transportation Division *strongly encourages* the use of bicycle helmets and other protective devices by Fleet Bicycle riders. If you choose to wear a helmet, you may provide your own personal helmet or check one out. City bicycle, e-bicycle, and cargo tricycle riders *are required* to wear closed toed shoes for safe bicycling.

Per the *California Vehicle Code*, riders must be over the age of 16, and *are required* to wear helmets and have a valid driver license or instruction permit while operating a City e-scooter. Additionally, motorized scooters may be operated on bicycle paths, trails/bikeways, bicycle lanes (roadways if none exist), but *may not be operated* on sidewalks. City e-scooter riders *are required* to wear closed toed shoes for safe scootering.

Bicycle and Cargo Tricycle Sign-Out Procedures

To obtain a Fleet bicycle or cargo tricycle for use, you will need to follow these steps:

1. Use the Microsoft Outlook email platform.
2. Create a "Meeting" with the vehicle, look up by name (will be labelled similar to "Vehicle Bicycle 1", "Vehicle Cargo Tricycle").
3. You will receive a confirmation that the bicycle or cargo tricycle is available for use.
4. Obtain U-Lock Key for the bicycle from the Public Works administrators.
5. Unlock U-Lock and remove bicycle from bicycle rack.
6. Place U-Lock in holder located on left side of bicycle by the seat (cargo tricycle does not have this feature).

Bicycles and the cargo tricycle are located at the eastern entrance to the City Hall Administration Building within the "caged" area. Each City-owned bicycle comes equipped with a U-Lock, rear reflector, and front light. Prior to riding a Fleet Bicycle, each rider is responsible for ensuring that the Fleet Bicycle is in good working order and possesses all of its equipment.

Should a bicycle not be in good working order or if any of the bicycle's equipment is missing, the rider is responsible for immediately reporting these issues to the TDM Coordinator.

As bicycles have limited basket storage space, please remember to bring a backpack or bag in case you need additional space for carrying items or equipment with you while you ride.

E-Bicycle and E-Scooter Rental Procedures

To obtain an e-bicycle or e-scooter for a one or two week rental to assess it, please contact the TDM Coordinator for availability and scheduling.

Additional Questions

Please contact the City Transportation Division at transportation@menlopark.org

Form Submission

Please submit the completed form to the TDM Coordinator, Nicholas Yee.

SUSTAINABLE TRANSPORTATION FLEET APPLICATION

Application Instructions: Please complete this Form by providing all of the information requested in **Sections A, B, and C**. Once completed, please submit the Form to the Transportation Division directly, by inter-office mail, or by e-mail to transportation@menlopark.org. **Note:** Incomplete Forms will **not** be processed and returned to the employee.

Section A: Employee Information

Name: _____

City E-Mail: _____

Telephone: _____

Department: _____

Location: _____

Supervisor: _____

If made available by the City, I would be interested in attending on-street bicycling safety training. Yes _____ No _____

Section B: Sustainable Transportation Fleet Policies

Signature below denotes Employee acknowledgment of the following Program conditions of participation.

- I understand that participation in this Program is voluntary and request to participate of my free will.
- I attest that I am able to safely and proficiently ride a bicycle, e-bicycle, e-scooter, or cargo tricycle as of this date, and accept that I may be asked to demonstrate my ability to safely and proficiently operate said vehicle at any time.
- I attest that I do not currently have any impediments or conditions that prevent me from safely operating a vehicle.
- I understand that I am expected to understand and abide by the City of Menlo Park's Administrative Policy - *Use of City Owned and Privately Owned Vehicles for City Business,* the *California Vehicle Code*, and all other applicable policies and regulations while operating a bicycle, e-bicycle, e-scooter, or cargo tricycle.
- I acknowledge that I will not allow others to use a Fleet vehicle that is checked out to me.
- I understand that I am always expected to operate a Fleet vehicle safely and courteously.
- I understand that failure to abide by Sustainable Transportation Fleet policies may result in my being temporarily or permanently removed from participating in the Sustainable Transportation Fleet program.

Signature _____ Date: _____

Section C: Supervisor Endorsement

Endorsement is required for employees planning to use a Fleet vehicle to conduct City business.

I endorse this employee's request to participate within the Sustainable Transportation Fleet program.

Printed Name: _____ Signature _____ Date: _____

Transportation Division Use Only:

Received By / Date: _____ **Form Complete?** _____ **Endorsed?** _____ **Approve?** _____ **Deny?** _____ **Return?** _____

CITY OF MENLO PARK SUSTAINABLE TRANSPORTATION FLEET PROGRAM

WAIVER AND RELEASE FROM LIABILITY / ASSUMPTION OF RISK

I have voluntarily agreed to participate in the City of Menlo Park Sustainable Transportation Fleet Program in which the City of Menlo Park is making City-owned bicycles, e-bicycles, e-scooters, and a cargo tricycle available for use by City Employees for the following purposes: (1) As a mode of transportation for conducting City business instead of using a Fleet or personally owned vehicle, (2) as a mode of transportation for making personal, non-commute trips before, during, or after the workday, and/or (3) as a short-term rental trial period to assess the viability of e-bicycles and/or e-scooters for City Employees' commute to/from work . In consideration of my participation in the City of Menlo Park Sustainable Transportation Fleet Program, I hereby agree to release the City of Menlo Park, its officers, agents, and employees from any and all liability for accidents, injuries, loss of and/or damage to me or property that may arise out of my participation in this activity. I understand that there is an inherent level of risk for injury or even death when riding a bicycle, e-bicycle, e-scooter, or cargo tricycle, even when much care is taken to make the activity safe. Knowing these inherent risks, nevertheless, I hereby assert that my participation in the City of Menlo Park Sustainable Transportation Fleet Program is voluntary and I thereby assume those risks and release, indemnify, and hold harmless the City of Menlo Park and all of the agents and persons mentioned above who (through negligence or carelessness) might otherwise be liable to me or any heirs or assigns for damages; other than acts of gross negligence or willful misconduct. I understand that this waiver, release and assumption of risk is binding on me and my heirs and assigns. Nothing herein shall be construed as a waiver or release of any right to receive worker's compensation benefits to which I may be entitled in the event I am injured in the course and scope of my employment.

I also understand I should be in good physical health to participate in the City of Menlo Park Sustainable Transportation Fleet Program, and I would not have participated in this program if I had any physical impediments or pre-existing medical conditions that would prevent me from safely bicycling or scootering. I have read and acknowledge the City of Menlo Park Sustainable Transportation Fleet Program Policies, and understand that the City of Menlo Park strongly encourages me to wear a helmet and use other protective gear, if necessary, while operating a bicycle. I understand and acknowledge that I must wear a helmet when riding a scooter, as mandated by the California Vehicle Code.

I further expressly agree that the foregoing waiver, release and indemnification is intended to be as broad and inclusive as is permitted by the law of the State of California and that if any portion therefore is held invalid, it is agreed that the balance shall, notwithstanding, continue in full legal force and effect. I understand my signature is a legal and binding signature and will be considered original if received by fax.

Signature: _____

Print Name: _____

Date: _____

U.S. Department of Transportation

Federal Transit Administration

U.S. Department of Transportation
Federal Transit Administration
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1200 New Jersey Avenue, SE
Washington, DC 20590
https://www.transit.dot.gov/about/research-innovation