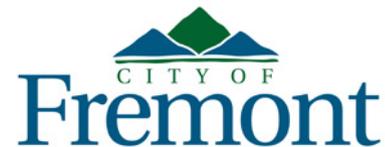




Fremont Innovation District
LAST MILE TRANSIT
Program Feasibility Study
and Conceptual Design



Prepared by:

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1. Executive Summary

The principal objective of the Innovation District Last Mile Transit Program Feasibility Study and Conceptual Design is to recommend potential near- and long-term sustainable and actionable transit programs. These programs are designed to improve access to the new Warm Springs/South Fremont (WS/SF) BART Station for existing and future employment centers and residents within two to three miles of the station. The Innovation District, which includes the areas of Warm Springs, South Fremont, and Bayside west of Interstate 880, is the City's most intense employment hub measuring over 2,500 acres set in an environment with considerable undeveloped or underdeveloped land. Development opportunities in the Innovation District allow for significant sustainable growth, but present a problem in mobility. Currently, there is not an adequate public transit system to connect employees from the WS/SF BART Station to their places of employment.

The missing connection between a transit hub and a final destination is referred to as a “last mile” challenge. It is a travel market not easily served by conventional transit, but can be captured by a well-designed and holistic alternative transit program including a shuttle service. Without last mile options, employees will opt out of public transportation or struggle to connect between transit stations and their worksite. This feasibility study seeks to:

- serve commuters arriving at the WS/SF BART station (including addressing midday transit options to Pacific Commons during the lunch hour)
- Reduce the number of people driving alone to work
- Identify potential near- and long-term last mile transportation solutions
- Provide a toolbox for sustainable funding and implementation strategies
- Develop a sustainable framework to accommodate phased growth
- Implement safe, reliable, comfortable, fast, and seamless transit options

To understand the barriers employees face in their daily commute and what influences their choice in transportation, Kimley-Horn issued an employee survey to the largest employers in the Innovation District, including: Western Digital, Solar City, Seagate, and LAM Research. Due to the underdeveloped infrastructure in the Innovation District, Kimley-Horn focused on a last mile shuttle service to fulfill the needs of the employees. The survey provided guidance on shuttle route designs, which were then presented at an open house for employers to provide feedback. A significant percentage of those surveyed reside in zip codes located along the BART corridors, and therefore could greatly benefit from the potential of a transit program (**Figure 6-4: Zip Code Distribution**).

Case studies show that the most effective transportation demand management (TDM) programs are best managed and monitored by transportation management associations (TMAs) formed by business communities and property owners. More often than not, boards of TMAs are comprised of their members/users, commuter representatives, key stakeholders, and typically include participation by the city, transit and other mobility providers.

A full-service “fare free” shuttle program (with 15 minute frequencies), including four peak period routes connecting WS/SF BART with the majority of businesses in the Innovation District, is estimated to cost approximately \$1.4 million annually to operate and administer. Because the Innovation District represents a large service area (nearly 4 square miles) and includes a diverse mix of small, medium and large-sized employers, rollout of a full-service transit program with a private shared-services funding model would be challenging. A conservative and strategically phased approach to rolling out the program based on demand is more likely to be funded and would ensure shorter headways.



It is anticipated that services may not be immediately available to all employers in the district due to the time that is needed to build up participation and formation of a TMA, but every effort should be made to connect employers for the purpose of collaborating to meet near-term needs. The transit program should start as a privately-funded shared-services model to allow for greater flexibility and local control. The future TMA can refine and scale up services as needed. Other funding structures are available, such as a property-based transportation services improvement district, but take much longer to establish due to their procedural complexities and requirements.

Based on preliminary feedback from employers and estimated demand for last mile service, Kimley-Horn recommends both near- and long-term frameworks for shuttle operations to address the last mile challenge. Last mile services should be phased by implementing a scalable shuttle program based on user demand and participation. In the short-term, a privately funded shared-service program could begin with one or two commute period routes and later be expanded in the long-term to a full service program of four commuter period routes, and also midday service, as participation grows. This is consistent with the City's vision to have the Innovation District become a multimodal district promoting sustainable and flexible alternative transportation options, reducing solo driving by an overall goal of 20 percent.



2. Statement of Purpose

Fremont's niche in the broader Silicon Valley ecosystem is its strength in advanced manufacturing, a fact well-represented by the most iconic example in the region, Tesla Motors. The Innovation District is the City's densest employment hub measuring over 2,500 acres, from approximately Auto Mall Parkway to Dixon Land Road (Fremont/Milpitas city limit line). It is one of the few remaining areas of Silicon Valley with substantial undeveloped or underdeveloped land. It represents one of the region's highest prospects for growth in innovation and domestic manufacturing. An approximately 880-acre area immediately surrounding the WS/SF BART Station offers the most expansive, raw acreage for contiguous development in all of the Innovation District. Development of this core area within the Innovation District is guided by the City's Warm Springs/South Fremont Community Plan (Community Plan) adopted in July 2014. The Community Plan is a progressive performance-based plan that furthers the goals and policies of the 2030 General Plan and establishes a unique and effective set of urban planning tools. It includes an overall vision for the creation of a vibrant, sustainable 21st century Innovation District with a mix of uses, a dynamic public realm and strong emphasis on enhancing multi-modal transportation. The Community Plan envisions up to 4,000 new housing units and 20,000 additional jobs in the Innovation District.

New development proposals adjacent to the WS/SF BART Station provide an opportunity to plan for growth with transit connectivity in mind. For new development to proceed and not lead to intolerable traffic congestion, integrating land use and transit is imperative so transit becomes an attractive option for commute and other trips. The Innovation District currently has public transit service, operated by the Alameda-Contra Costa Transit District (AC Transit) along major arterials, and limited Santa Clara Valley Transportation Authority (VTA) service along several major arterials as express buses. Currently, VTA buses serve the Santa Clara communities with a connection to the Fremont BART in Downtown Fremont. The extension of BART provides the Innovation District access to the communities along the approximately 110-mile BART system. BART will soon extend another 10 miles into eastern Santa Clara County, with new stations in Milpitas (Milpitas Station) and east San Jose (Berryessa Station). **See Figure 2-1, below.**

Public transit services will not adequately mitigate the mobility problems expected with continued development. Bus services currently do not offer extensive coverage of the Innovation District and are not effective in serving the businesses and their employees in the district. AC Transit and VTA are planning to reorient service to serve the new WS/SF BART Station. As south Fremont develops, AC Transit anticipates expanding and/or modifying service to accommodate the increase in demand for conventional public transit and is considering an on-demand service. However, conventional fixed-route transit faces challenges that can limit their effectiveness, resulting in the need for other last mile transit options.



Figure 2-1: BART Alignment in South Fremont, Including Phase 1 Extension to Santa Clara County (Late 2017)





Demand is typically not adequate to justify high service frequencies on a dense route network, even during peak commute periods. Extending regular bus service hours earlier into the morning and later into the evening is particularly difficult to justify when demand drops off. The costs of fixed-route service by an entity like AC Transit, on a per vehicle mile and vehicle hour basis, are also high due to high labor costs for bus drivers and maintainers. Therefore, it is likely cost-prohibitive for AC Transit to operate feeder bus connections to the WS/SF Station that will be sufficiently attractive for many employees of the Innovation District to shift from auto to transit for work and other trips.

The City of Fremont recognizes that transit connectivity to the WS/SF BART Station should be augmented by other services, in the near- and long-term. To address these concerns the City has initiated a study of ways to enhance connectivity to the WS/SF BART Station as the Innovation District continues to develop.

The goals for the Warm Springs Last Mile Transit Program Feasibility Study and Conceptual Design are focused on improving access to the new WS/SF BART Station for employees within two to three miles of the station, a travel market not easily served by conventional transit, but which likely can be captured by a well-designed shuttle service. The study is intended to identify solutions to the growing travel problems of the Innovation District as well as recognize improvements that can be implemented soon while addressing longer term transportation needs.

Kimley-Horn was selected to assist the City in developing a last mile transit service program that will achieve these goals. While service is primarily intended to enhance connections to the WS/SF BART Station, it should also provide enhanced transit access overall, for new residents wanting to access BART and for employees and residents who want to access other activity centers in the Innovation District within the catchment areas of last mile service. While designed for commuters traveling during the primary commute periods, last mile service should not overlook the travel needs of employees and residents during other hours. This will help further reduce reliance on auto travel, limiting congestion during non-peak periods.

Several other practical considerations have guided this study. They pertain to identifying, and then incorporating into any service proposals, the conditions that will help make a last mile program successful include:

- Obtaining stakeholder interest and support, which requires that service proposals be designed to serve their needs and that stakeholders have a voice in last mile program management.
- Establishing a program that is flexible, able to respond to changing needs, development patterns, and new technologies, among other factors. Different types of businesses and residents will have distinct needs and potentially add new layers of complexity.
- Stressing the importance of having and maintaining excellent customer relations. Establishing direct, cooperative relationships between the program sponsor, users, and employers allows for ongoing feedback and will facilitate planning for service changes and future improvements.



The following sections of this report describe the study process that has led to the recommendation of a last mile program for WS/SF BART. Near- to long-term service plans are proposed, and the implementation steps and management elements of a program outlined. The study process has proceeded through five basic steps:

1. Identify employers and stakeholders benefiting from (and expressing support for) a last mile program.
2. Document needs in the study area that will guide development of last mile program elements. Outreach to businesses and other stakeholders is critical.
3. Develop the program framework and the necessary elements for a successful last mile service, including:
 - Collaboration and participation by employers and property owners on a privately funded shared-services program at rollout
 - Partnership opportunities between the private and public stakeholders (e.g., Fremont or AC Transit) to fund and/or operate a program.
 - Transit service alternatives that the stakeholders can select from and which are perceived to best address their needs.
 - Resource requirements including equipment, facilities, infrastructure improvements to implement and operate a program.
 - Specific funding strategies that will ensure the long-term viability and growth of a program.
4. Select the preferred last mile service concept.
5. Package the last mile program, based on a cost-effective business model, feasible financing, and stakeholder buy-in, for implementation.



3. Introduction

3.1 City of Fremont

The City of Fremont, incorporated in 1956, is the 4th largest city in the Bay Area and the 15th largest city in California. The City is located in the East Bay region of the southeast section of the San Francisco Bay Area. The City benefited from high-tech employment growth in the 1980's and 1990's, which allowed the City to rapidly develop during this period. Five original districts were incorporated in 1956 to create the City of Fremont and they include Centerville, Niles, Irvington, Mission San Jose, and Warm Springs. The City's General Plan Community Plans Element provides policies for 11 geographic subareas within these five former districts, which collectively cover the entire City. Community Plan Areas that form the Innovation District include: South Fremont, Warm Springs, and Bayside Industrial.

Fremont is part of Silicon Valley and is well-positioned for growth due to the presence of numerous Bay Area technology and manufacturing companies. BART will extend 10 miles further south to San Jose, providing access to the Fremont from both the north and the rest of Silicon Valley to the south. The City's quality of life, amenities, job opportunities, and geographic location offers an attractive home to this highly active, highly educated, and skilled workforce.

3.2 Fremont Innovation District

The Innovation District is bounded by Auto Mall Parkway in the north, Dixon Landing Road on the south, I-680, Mission Boulevard, Warm Springs Boulevard on the east, and the Bay Lands on the west. The Innovation District was designated in the Fremont Advanced & Sustainable Technology (FAST) Center for Innovation Strategy document in 2014. The Innovation District provides opportunity for clean technology and advanced manufacturing to grow in Fremont and is home to many state-of-the-art businesses, including ThermoFisher, Delta Products, Tesla Motors, Seagate, Solar City, and others.

Companies in the Innovation District are working in the fields of computer science, clean technologies, life sciences, and advanced manufacturing. Currently, there are over 20,000-30,000 employees employed in the Innovation District and, at projected buildout, employment within the district is expected to reach 50,000 employees. Additionally, with the new WS/SF BART Station, the Innovation District is on track to become a top Bay Area location for employment-focused, transit oriented development.



Figure 3-1: Fremont Innovation District





Many employers currently have multiple office, manufacturing, and laboratory locations within the Innovation District and will benefit from a shuttle service to and from the WS/SF BART Station. Existing employers, such as those in the Bayside Industrial and Warm Springs subareas, will benefit the most from a shuttle service as they are typically located a farther distance from the WS/SF BART Station than future near-term developments.

Fremont’s major retail district, Pacific Commons (which includes The Block) located between half a mile and five and a half miles from major employers in the Innovation District, provides employees local options for lunch, shopping, and to run errands. Other options include retail centers along Warm Springs Boulevard located in the southern reach of the Innovation District. Travel to these key retail areas within the Innovation District is primarily accomplished by auto, as the distance for most employees to travel by bike or to walk is too great. AC Transit routes are not feasible options because they are too infrequent and can take too long for reasonable employee mid-day breaks. For example, according to AC Transit planners, current and planned peak and midday service frequencies are 30 to 60 minutes on bus routes serving south Fremont.

Primary Innovation District Employers

The largest employers in the Innovation District include the following:

- Delta Products
- Solar City
- Marriott
- Bruker Biospin
- Tesla Motors
- Western Digital
- Lam Research
- Seagate
- ThermoFisher Scientific
- Quantenna
- Boston Scientific
- Stryker
- Quanta Computer
- Mattson Technology
- Mentor Graphics
- ESS Technology
- Corsair Memory
- Asteelflash
- Renaissance
- Sonic Manufacturing
- Unigen
- ASI Corp
- Intematix
- Optoplex
- Pantronix
- Ikanos Communications

Pacific Commons Employers

Pacific Commons, including The Block, is anchored by Target, Lowes, Costco, Century Theatres with several additional stores/employers, including:

- Bennigan’s
- Blaze Pizza
- Boneheads
- Bowl of Heaven
- Buffalo Wild Wings
- Carter’s
- Cream
- Ono Hawaiian BBQ
- Osh Kosh
- Pancheros Mexican Grill
- Sleep Number
- T-Mobile
- Which Wich
- Technology Credit Union
- Dick’s Sporting Goods
- Dress Barn
- Krispy Kreme
- Men’s Warehouse
- The Habit Burger Grill
- The Kebab Shop
- ULTA



3.3 Warm Springs/South Fremont BART Station

Major construction on the Warm Springs Extension began in August 2009. Construction of the track extension and WS/SF BART Station began in October 2011. The WS/SF BART Station opened for service on March 25, 2017.

The WS/SF BART Station will provide Innovation District employees faster and more reliable commutes than cars, buses, etc. It is anticipated that approximately 12 to 15 percent of daily peak hour commutes to and from the Innovation District will use the new WS/SF Fremont BART Station.

3.4 Warm Springs/South Fremont Community Plan

The Warm Springs/South Fremont Community Plan (Community Plan) provides the blueprint to guide development of the approximately 880-acre core of the ±2,500-acre Innovation District into a center for innovation and employment. This core area will provide a mix of compatible uses focused around the synergy of the new WS/SF BART Station. It is bounded by Interstate 880 on the west, Interstate 680 on the east, Auto Mall Parkway on the north, and Mission Boulevard on the south. It is one of the largest and last contiguous 880 acres of underdeveloped land located along the BART line in Silicon Valley. The WS/SF BART Station will be the only station capable of sustaining a major employment center between Oakland and its current planned end of the line at Berryessa in San Jose.

Major projects are planned in the Community Plan area, including Lennar Area 4, Old Warm Springs Boulevard South (Valley Oak Partners), Warm Springs TOD Village (Toll Brothers), and the Warm Springs/South Fremont West Access Bridge and Plaza. They are shown in **Figure 3-3: Warm Springs/South Fremont Community Plan Area Major Projects** and major components of each project are discussed below.

Lennar Area 4

The Area 4 master plan project developed by Lennar encompasses approximately 111 acres immediately west of the WS/SF BART Station and includes a new elementary school, neighborhood park, urban parks and plazas, 2,214 housing units (including 290 affordable rental units), and 1.4 million square feet of commercial and industrial space. The project will be constructed in multiple phases, with roadway and utility construction being completed first. The elementary school, neighborhood park, and affordable housing will be constructed once roadway and utility construction are completed. Later phases will include the commercial and industrial developments anticipated over the following five to 10 years.

Old Warm Springs Boulevard South

The Old Warm Springs Boulevard South master plan project developed by Valley Oak Partners encompasses approximately 28 acres north of South Grimmer Boulevard. This development will include 785 housing units (including 102 affordable rental units), approximately 325,000 square feet of commercial space, a 150-room full-service hotel, urban plazas and linear parks.

Warm Springs TOD Village (Toll Brothers)

The Warm Springs TOD Village master plan project developed by Toll Brothers encompasses approximately 35 acres immediately east of the WS/SF BART Station. The project will include 1,001 housing units (including 132 affordable rental units) and 5,000 square feet of commercial space. The project will also include urban plazas and recreation amenities.



Figure 3-2: Warm Springs/South Fremont West Access Bridge and Plaza



Warm Springs/South Fremont West Access Bridge and Plaza

In April 2016, the Warm Springs West Side Access Bridge and Plaza project was approved, increasing multimodal connectivity to the WS/SF BART Station. The City partnered with BART on this project. It supports sustainable smart growth and multi-modal access and connectivity to existing and future employment centers within and surrounding the Innovation District. A pedestrian and bicycle bridge will connect the WS/SF BART Station to properties west of the station and an urban public plaza that will directly lead into urban linear parks and the Innovation District's signature street, Innovation Way, constructed by Lennar as part of their 110-acre mixed-use development. The West Access Plaza will become the major focal point of the Innovation District, providing a large open gathering space. At that time, transit programs could be adjusted accordingly to allow for operating efficiency, potentially reducing travel times for shuttle routes traveling west of the station. Site preparation work for the project is already underway. Construction of the project is anticipated to be completed by early 2019.



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Figure 3-3: Warm Springs/South Fremont Community Plan Area Major Projects





4. Existing Conditions

Field surveys were conducted in summer 2015 by Kimley-Horn staff. The surveys collected data used to evaluate and identify gaps in the existing Innovation District infrastructure. Infrastructure elements evaluated included roadways, sidewalks, transit stops as well as bike lanes, routes, and paths. Reviews of AC Transit and VTA routes within the Innovation District were also conducted to better understand the area's circulation patterns. The discussion on existing infrastructure conditions and locations and roadways is summarized in Section 4.1 below, with more detail provided in Appendix A of this report.

4.1 Roadway, Bike, and Pedestrian Infrastructure

Regional access to the Innovation District is obtained from Interstate 680 (I-680) and Interstate 880 (I-880). Primary north-south circulation internal to the Innovation District and south Fremont in general is obtained via Warm Springs Boulevard, Fremont Boulevard, and Mission Boulevard. Primary east-west circulation is obtained via Auto Mall Parkway, Grimmer Boulevard, Cushing Parkway, Warren Avenue, and Dixon Landing Road. The existing roadway framework will provide the network over which a last mile service will operate—at least initially. There are, however, arterial and local street segments still to be improved in conjunction with new development. These future improvements are discussed in Section 5. Routing of a last mile service would be adjusted over time to take advantage of the enhanced circulation opportunities offered by an expanded roadway network.

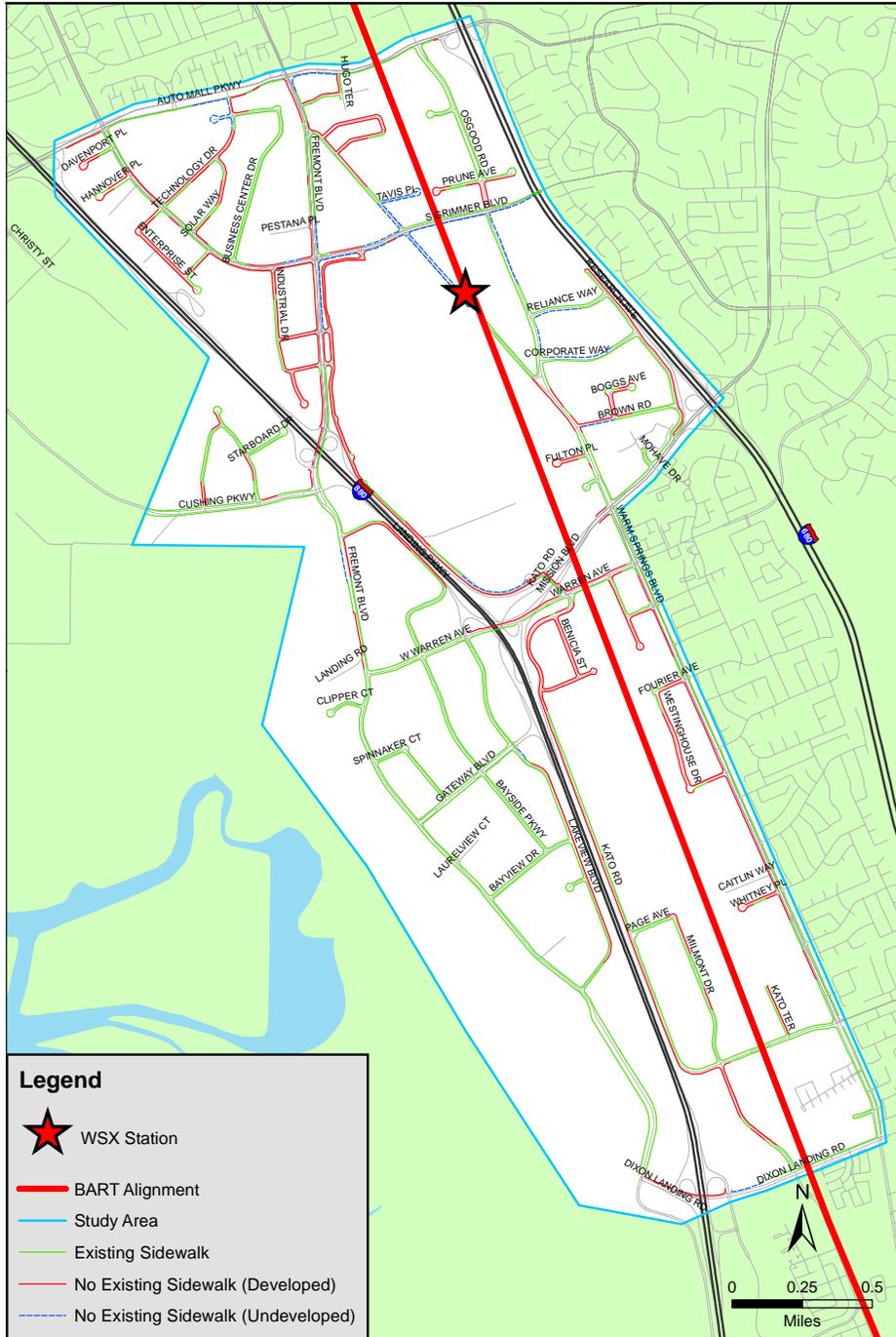
Pedestrian Infrastructure

The existing sidewalk network was evaluated in summer 2015 via a site visit and review of Google Earth aeriels. Segments without existing sidewalks are split into two sections: “No Existing Sidewalk (Developed)” and “No Existing Sidewalk (Undeveloped)”. **Figure 4-1: Existing Sidewalk Infrastructure** identifies existing sidewalks and gaps in the network.

The sidewalk network is extensive but includes substantial gaps adjacent to undeveloped parcels. These gaps will in most instances be closed when new development or redevelopment occurs. The location of stops for a last mile service will need to account for local access opportunities and constraints. As for roadway segments, adjustments in stop location may be warranted as the pedestrian infrastructure is built out.



Figure 4-1: Existing Sidewalk Infrastructure





Bicycle Infrastructure

Bicycle facilities in the study area are shown in Figure 4-2, categorized by class: bike paths (Class I—segregated from the roadway); bike lanes (Class II—located on City streets and marked by pavements striping and signed to provide some separation from roadway traffic); and bike routes (Class III—which share the travel lane with other vehicles and are designated by signage only). The existing network is not extensive but will be expanded as development proceeds and gaps in the roadway network are closed. As for pedestrian facilities, a last mile service should locate stops to accommodate bicyclists who may want to use bikes to make the last (or first) segment of a trip. Study of the need for bike facilities (lockers, secure stalls, even shared bike facilities) co-located with certain shuttle stops or at employment centers as required by the City's zoning ordinance is recommended as a last mile program is established.

4.2 Existing Transit Services and Infrastructure

Rail

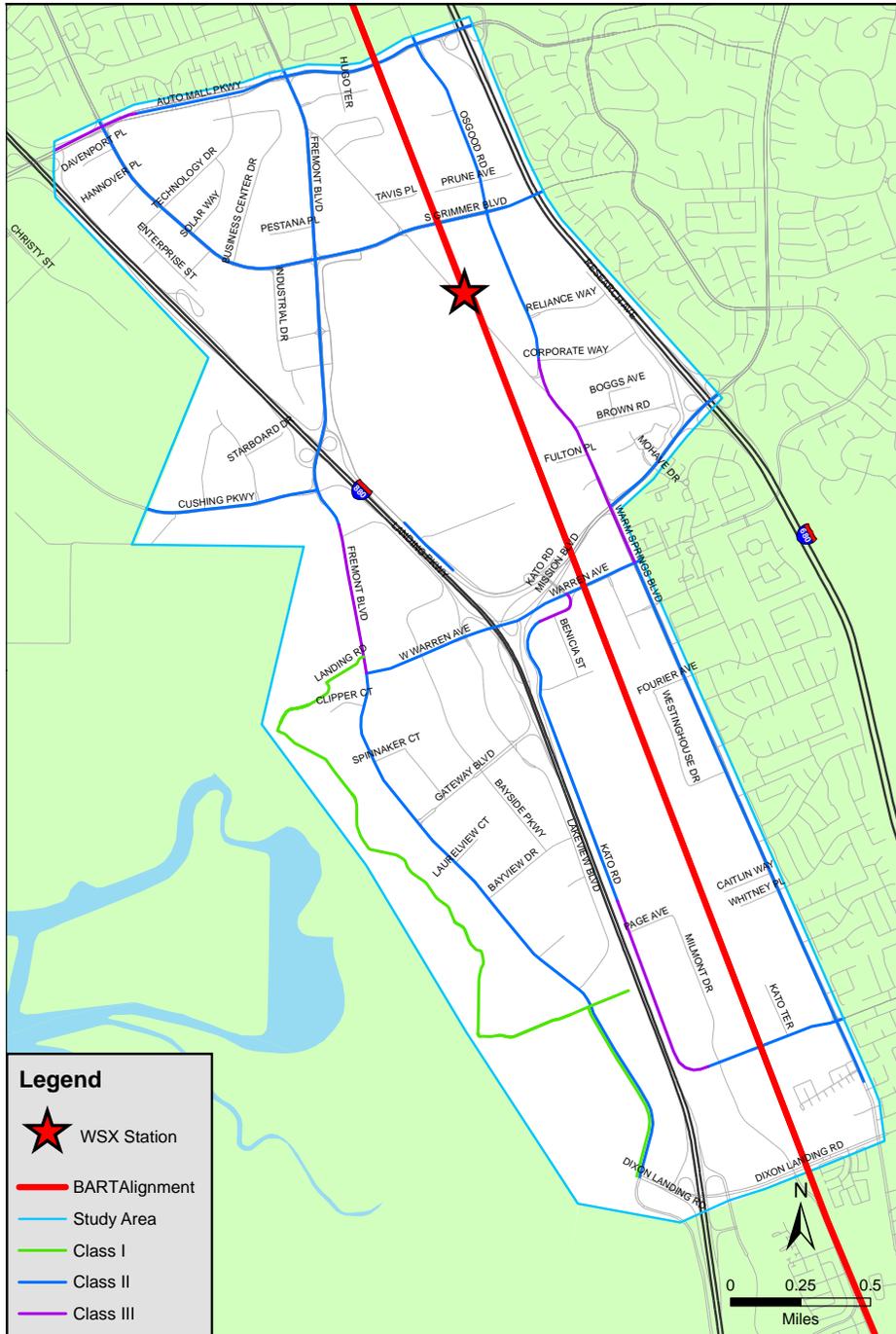
Existing transit in the study area includes BART and buses. The Fremont BART Station is located off Civic Center Drive (between Mowry Avenue on the north side and Walnut Avenue on the south side) in central Fremont. The Fremont BART Station includes surface parking (2,030 spaces) and a bus transit center on the east side of the station with access from Walnut Avenue.

BART service has been extended to the WS/SF BART Station in the Innovation District. The station is at-grade and aligned north-south next to the Union Pacific Railroad (UPRR) corridor, which is immediately west of the station. The bus transit center and surface parking of approximately 2,000 spaces are east of the station structure, accessible from Warm Springs Boulevard running parallel to the BART and UPRR alignments. Like other BART stations, there are kiss-and-ride and short- and long-term bicycle parking facilities on the principal east side of the station. With completion and opening of the Warm Springs West Access Bridge and Plaza, additional pedestrian and bicycle access to the station will be provided, including additional short- and long-term bicycle parking facilities.

Current BART weekday service is summarized below. Two lines operate to and from the Fremont BART Station: Fremont-Richmond and Fremont-San Francisco. The Fremont-Richmond line serves downtown Oakland as its major activity center.



Figure 4-2: Existing Bike Infrastructure

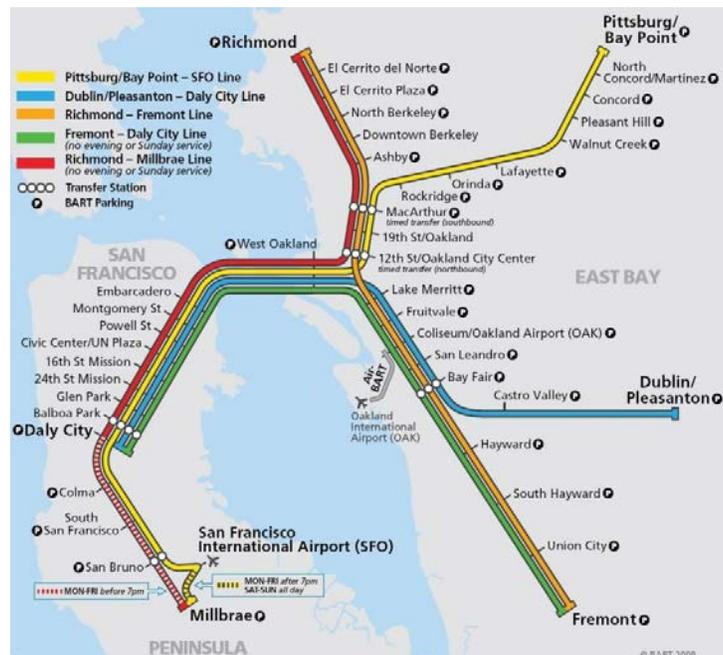




| | Depart Fremont | Arrive Fremont | Frequency |
|--|----------------|----------------|------------------|
| Weekday San Francisco Trains | | | |
| Begin full service pattern | 5:06 AM | 7:16 AM | Every 15 minutes |
| End full service pattern | 5:51 PM | 8:01 PM | Last BART train |
| Weekday Oakland/Richmond Trains | | | |
| Begin full service pattern | 4:00 AM | 5:21 AM | Every 15 minutes |
| | 7:15 PM | 8:38 PM | Every 20 minutes |
| End full service pattern | 12:00 AM | 1:29 AM | Last BART train |

On Saturdays, service between Fremont BART and San Francisco operates every 20 minutes from 8:50 AM to 8:01 PM. Service between Fremont BART and Oakland/Richmond is also every 20 minutes beginning at 5:54 AM and ending at 1:29 AM. On Sundays there is no direct service between Fremont and San Francisco. Service between Fremont and Oakland/Richmond is every 20 minutes from 7:54 AM to 1:29 AM. Passengers can transfer from the Oakland/Richmond service to San Francisco service at the Bay Fair Station and other points north along the Fremont-Richmond line.

Limited service to WS/SF BART Station has begun and is therefore included in the discussion of existing conditions. Initially, the assumption was service to WS/SF BART would be an extension of the weekday and weekend service patterns currently operated at Fremont BART. However, at least in the short term, BART will lack sufficient rail cars to run both the Fremont-San Francisco and Fremont-Richmond lines to WS/SF on 15-minute weekday frequencies. Therefore, the service pattern to WS/SF has been curtailed at initial rollout of service.



BART is replacing its current rail car fleet, with the first 10 test cars that arrived in 2016 and possibly 60 new cars in revenue service by the end of 2017 and 405 new cars in service by late 2018 or early 2019. This would result in a total fleet of 905 cars by 2019 (a mix of new and existing cars that are still suitable for revenue service). For comparison, the current BART fleet is 669 cars. BART's goal is to procure all 775 new cars by 2021 and have a total fleet of 1,081 cars at that time. The procurement of 775 new cars will provide the additional vehicles required to operate the WS/SF extension and the Santa Clara County BART extension to East San Jose.

BART opened its service to the WS/SF BART on both weekdays and weekends on March 25, 2017. Initially some transfers will occur at the Fremont Station. However, it is anticipated that the proposed fleet of 905 cars by 2019 will be adequate to run 10-car trains on all peak service into San Francisco as well as full service on other lines; the number of passenger seats in the fleet will increase by 26%. The fleet at that time would be adequate to operate full service to WS/SF BART.



Until there are sufficient new cars to extend a full service pattern to WS/SF, BART has implemented the following arrival and departure times at the new WS/SF Station on weekdays:

| | Depart WS/SF | Arrive WS/SF | Frequency |
|-------------------------------------|--------------|--------------|------------------|
| Weekday San Francisco Trains | | | |
| Begin Partial service pattern* | NA | 4:53 AM | Every 15 minutes |
| Begin full service pattern | 4:00 AM | 6:20 AM | Every 15 minutes |
| End full service pattern | 5:45 PM | 8:05 PM | Last BART train |

**First 6 train arrivals will begin service at Union City BART upon dispatch from the BART Hayward Yard.*

Weekday Oakland/Richmond Trains

| | | | |
|----------------------------|----------|---------|------------------|
| Begin full service pattern | 5:54 PM | 5:53 PM | Every 15 minutes |
| | 7:28 PM | 7:08 PM | Every 20 minutes |
| End full service pattern | 11:53 PM | 1:35 AM | Last BART train |

On weekends, initially there will be service between WS/SF BART and Oakland/Richmond only. There will be no direct service between WS/SF BART and San Francisco. Currently, there is limited direct Saturday service between Fremont BART and San Francisco and no direct Sunday service. This service pattern will be retained, according to BART. Weekend service between WS/SF BART and Oakland/Richmond will be every 20 minutes.

On Saturdays the first train departs the WS/SF station at 5:48 AM and the last train at 11:53 PM. On Sundays the first train departure to Oakland/Richmond is at 7:48 AM and the last train at 11:53 PM. For passengers wanting to travel from (to) WS/SF BART to (from) San Francisco, transfers will need to be made at Bay Fair BART.

For planning purposes, a last mile service should be designed initially to connect to trains operating on the interim weekday schedule for AM arrivals and PM departures. When BART adds trains and begins operating a normal, full service pattern to WS/SF, assumed to be by 2019, the last mile service connections would be adjusted accordingly. See Section 6 for more detail.

Fixed-Route Bus

BART stations are major transportation hubs. Several bus services that serve the current end-of-line Fremont BART Station are anticipated to shift to the WS/SF BART Station, although this may occur in phases over a year or more. This is due in part to the fact that BART service to WS/SF will be expanded over time; it is logical for connecting bus service to follow a similar pattern. Additionally, Fremont BART is a major activity center while development around the WS/SF BART Station is still emerging. There is a stronger market for bus service, particularly demand from residential areas, in the areas north and east of the WS/SF BART Station.



The following two public transit operators serve the study area:

- (1) Alameda Contra Costa Transit District (AC Transit); and
- (2) Santa Clara Valley Transportation Authority (VTA).

Both currently serve the Fremont BART Station and are anticipated to serve the WS/SF BART Station. A last mile service should be designed to complement these services, avoiding duplication of service (when fixed-route and/or on-demand services are frequent and provides access to the desired locations) and conflicts at transit stops. Other private or public entities could decide to provide service to the WS/SF BART Station.¹ At this time, however, these potential other private shuttle services have not been identified. Should they emerge, a last mile service would need to coordinate operations with them to ensure, as with AC Transit and VTA, that all transit services complement one another to the advantage of users. A key role in this effort could start with the chair of a future steering committee and later, upon incorporation as a legal entity, replaced by an executive director of its transportation TMA.

For this study, the discussion of other transit services in the study area focuses on AC Transit and VTA, which are the known operators and likely to be primary service providers in the future.

AC Transit

AC Transit operates substantial fixed route local service in Warm Springs/South Fremont. The primary routes operate out of Fremont BART and serve the Mission Boulevard, Fremont Boulevard, Osgood/Warm Springs Boulevard, and Grimmer Boulevard corridors, which are oriented in the north-south direction. (Grimmer Boulevard curves to be aligned east-west just north of the Warm Springs BART Station.) **Table 4-1: Existing AC Transit Fixed-Route Bus Services in South Fremont (No WS/SF BART Station)** lists the routes and their service characteristics.

Three of the listed routes, AC Transit Route 215, 217 and 239, currently provide connections from Fremont BART to or beyond the Santa Clara County line. One of the listed routes, Route 212 proceeds via Fremont Boulevard to Durham Road/ Auto Mall Parkway, and then proceeds west to serve Pacific Commons. Route 99 is included in the table because it connects BART stations from Bay Fair BART in Hayward to Fremont BART using major arterials. It is a likely candidate for extension of service to the Innovation District.

AC Transit's 200-series routes wind through WS/SF area to connect existing major employers and several of the major retail centers there to Fremont BART; however, due to relatively light demand, service levels and service periods are somewhat limited. Weekday headways are typically no more frequent than every 30 minutes; however, two of the four routes operate weekdays only. This means buses can only serve every other train on, for instance, the Fremont-San Francisco BART line or the Fremont-Richmond line. Also, there are gaps in service coverage on certain days of the week and limited late evening service.

With the addition of the WS/SF BART Station, AC Transit states that only minor changes will be proposed to existing fixed-route services. AC Transit is also considering implementation of a pilot on-demand, flex service from the WS/SF BART station to certain areas within the Innovation District and Pacific Commons (e.g., Bayside Industrial, Pacific Commons retail district and Fremont Auto Mall). In the near term, however, AC Transit fixed-routes 215 and 239, which follow Warm Springs Boulevard through South Fremont/Warm Springs, will divert into the station and stop at the rail-bus transit center. For Route 215, this is a minor change, requiring buses to turn off Warm Springs Boulevard, circle through the station and then return to

¹ Some employers in South Fremont/Warm Springs have operated shuttle bus connections to Fremont BART, including Tesla and LAM Research, the latter discontinued a couple of years ago. These services are candidates for replacement by a proposed last mile service. However, it is possible some employers could elect to provide their own service even after a shared last mile service is initiated. These potential services are not addressed in this section.



Warm Springs Boulevard. For Route 239, buses will need to divert to Warm Springs Boulevard at Grimmer Boulevard instead of following Mission Boulevard to Warm Springs Boulevard.

According to AC Transit planners, no changes in the alignments of Routes 212 and 217 are anticipated. At this time, no changes in Route 99 are proposed. Nevertheless, it is possible that in the longer term the route could be continued from Fremont BART to WS/SF BART, consistent with its purpose to provide local transit connections between all BART stations south of Bay Fair BART.

Table 4-1: Existing AC Transit Bus Services in South Fremont/Warm Springs (No WS/SF BART Station)

| Route | Origin-Destination | Service Periods | Service Frequency |
|------------|--|--------------------------------|---|
| 212 | Fremont BART to Pacific Commons; limited service to New Park Mall via Fremont Blvd, Auto Mall Pkwy & Christy St | All day, weekdays and weekends | 30 minutes all day weekdays and weekends |
| 215 | Fremont BART to Northwest Polytechnic University and Warm Springs District via Paseo Padre Pkwy, Osgood Rd, Grimmer Blvd, Fremont Blvd and Warm Springs Blvd | All day, weekdays only | 60 minutes |
| 217 | Fremont BART to Northwest Polytechnic University; limited to Great Mall via Mission Blvd, Warm Springs Blvd, and N. Milpitas Blvd | All day, weekdays and weekends | 25-30 minutes peak and midday, 30 minutes evenings; 30 minutes weekends |
| 239 | Fremont BART to Warm Springs Plaza shopping center; limited service to Dixon Landing Road via Paseo Padre Pkwy, Grimmer Blvd, Mission Blvd, Warm Springs Blvd and Dixon Landing Rd | All day, weekdays only | 30-60 minutes (latter mainly in evening) |
| 99 (& 801) | Bay Fair BART to Fremont BART via Mission Blvd and Fremont Blvd | All day, weekdays and weekends | 20 minutes peak and midday and 30 minutes evenings on weekdays; 30-45 minutes weekends; 60 minutes over night (Route 801) |

Service periods and service levels on all AC Transit routes currently serving South Fremont/Warm Springs are not anticipated to significantly change in the near term because of the WS/SF BART Station (see **Table 4-2: Anticipated AC Transit Fixed-Route Bus Services in South Fremont/Warm Springs With WS/SF BART Station** below). However, the City will continue to work closely with AC Transit on a pilot on-demand, flex service that would improve last mile connection opportunities to key areas within the Innovation District and Pacific Commons. As it develops and is implemented, additional changes to AC Transit's fixed-route bus services can be anticipated.



Table 4-2: Anticipated AC Transit Bus Services in South Fremont/Warm Springs following Opening of WS/SF BART Station

| Route | Origin-Destination | Anticipated Change in Service Periods and Frequencies Compared to Existing (Table 3-1) |
|------------|--|--|
| 212 | Fremont BART to Pacific Commons; limited service to New Park Mall via Fremont Blvd, Auto Mall Pkwy and Christy St | No change in service patterns, service periods, or service levels. |
| 215 | Fremont BART to Northwest Polytechnic University and Warm Springs District via Paseo Padre Pkwy, Osgood Rd, Grimmer Blvd, Fremont Blvd., Warm Springs Blvd, WS/SF BART , Warm Springs Blvd. | No change in service periods or service levels; route service pattern along Warm Springs Blvd to be modified to divert into the new WS/SF BART Station, then continue to Northwest Polytechnic |
| 217 | Fremont BART to Northwest Polytechnic University; limited service to Great Mall via Mission Blvd, Warm Springs Blvd, and N. Milpitas Blvd | No change in service patterns, service periods, or service levels. |
| 239 | Fremont BART to Warm Springs Plaza; limited service to Dixon Landing Road via Paseo Padre Pkwy, Grimmer Blvd, Warm Springs Blvd to WS/SF BART ; Warm Springs Blvd and Dixon Landing Rd | No change in service periods or service levels; route service pattern along Grimmer and Mission Blvds to be modified to divert into Warm Springs Blvd and enter the new WS/SF Station, then continue along Warm Springs Blvd to Northwest Polytechnic and Dixon Landing Rd |
| 99 (& 801) | Bay Fair BART to Fremont BART via Mission Blvd and Fremont Blvd. | No change in service patterns, service periods, or service levels proposed at this time |

VTA

Four routes operate in and out of Fremont BART from Santa Clara County. These are listed in **Table 4-3: Existing VTA Fixed-Route Bus Services in South Fremont/Warm Springs (No WS/SF BART Station)** below, along with their basic service characteristics.

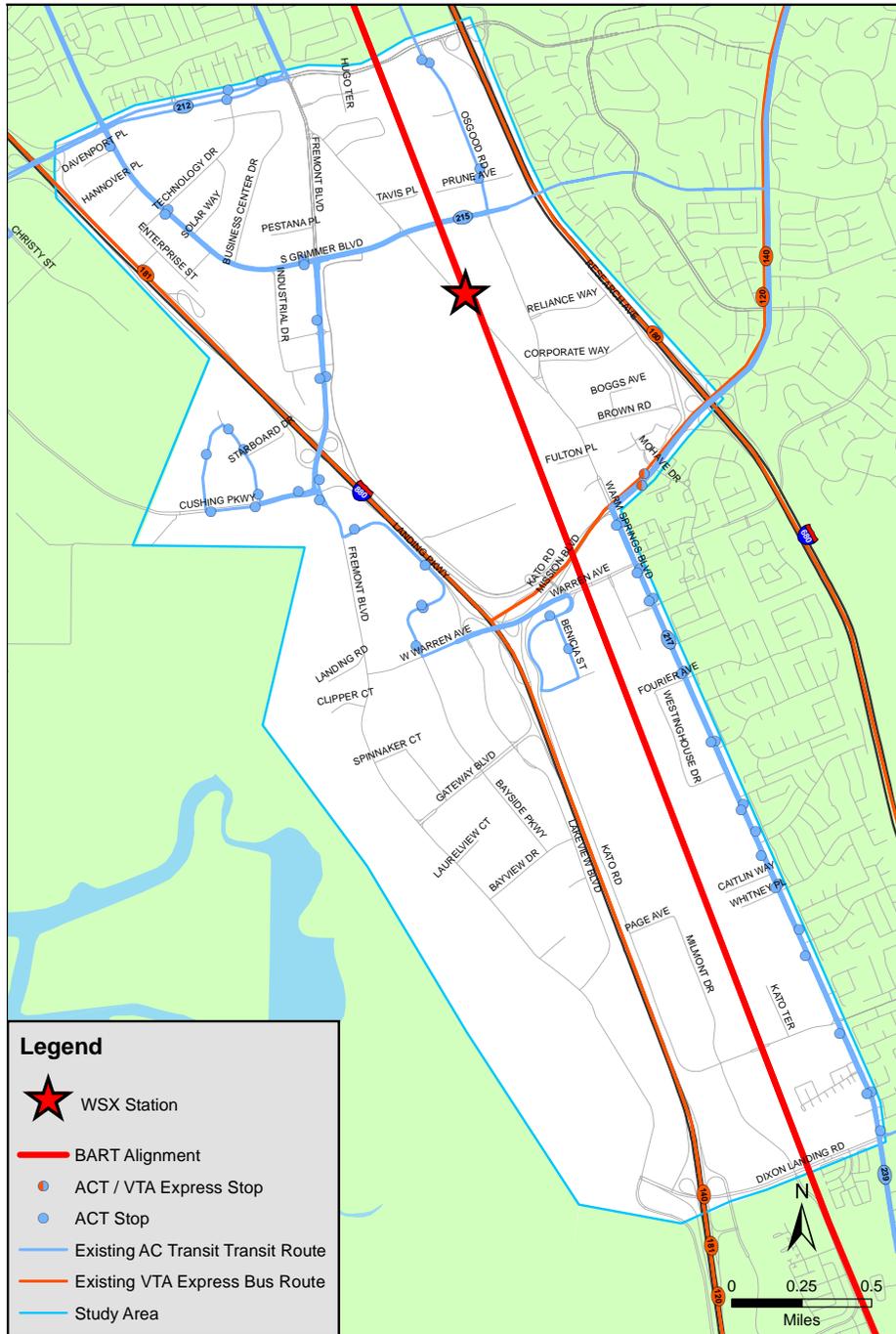
Routes 120 and 140 are peak periods only, Route 180 is all day weekdays only, and Route 181 operates all day weekdays and weekends. All are express services and follow I-880 or I-680 freeways for a portion of their alignments (see **Figure 4-4: Existing Transit Network**). Proceeding north to south, once leaving Fremont BART the first three routes follow Mission Boulevard through a good portion of Fremont before entering the freeway; the fourth, Route 181, follows Stevenson Boulevard to I-880 to access Santa Clara County destinations, including downtown San Jose.

Table 4-3: Existing VTA Bus Services in South Fremont/Warm Springs (No WS/SF BART Station)

| Route | Origin-Destination (North to South) | Service Periods | Service Frequency |
|-------|--|-------------------------------|---|
| 120 | Fremont BART to Lockheed Martin, via Mission Blvd, I-880 & SR 237 | Peak periods, weekdays only | 15-30 minutes, peak direction only |
| 140 | Fremont BART to Mission College & Montague Expressway, via Mission Blvd, I-880, & Tasman Drive | Peak hour, weekdays only | 30-45 minutes, peak direction only |
| 180 | Fremont BART to Great Mall & Eastridge Transit Center via Mission Blvd, I-680 | All day, weekdays only | 30 minutes peak & midday; 60 minutes evenings |
| 181 | Fremont BART to San Jose Diridon Stn via Stevenson Blvd., I-880 & N. First St. | All day weekdays and weekends | 15 minutes peak and midday, 30 minutes evenings on weekdays; 20 minutes during day & 30 minutes evenings on Sat & Sun |



Figure 4-3: Existing Transit Network





At this time, VTA has determined not to make major bus service changes. Modifications to corridor local and express services will be implemented when the Berryessa Extension opens instead. VTA has not indicated what service changes will be made and how they might affect existing corridor bus service. VTA is undertaking a comprehensive operations analysis of its bus and light rail routes, with findings still in draft form. The first service change should be implemented in 2017. The service changes from the comprehensive operations analysis will include the service VTA will operate to the WS/SF, Milpitas, and Berryessa BART stations.

As implementation of Fremont's last mile program advances, coordination with VTA on future bus service changes in the corridor will be necessary. However, given the fact that VTA service to BART stations in Alameda County does not currently focus on transporting passengers to and from activity centers in Alameda County (the focus is, of course, on passengers traveling to and from Santa Clara County), VTA service changes will likely not have a major impact on the design and operation of last mile service in the Innovation District.



5. Future Conditions

The previous section, Existing Conditions (Section 4), discusses conditions that will exist with the WS/SF BART Station and describes the anticipated interim, near-term BART service condition to and from the WS/SF Station and potential corresponding changes in local and regional bus services. This section discusses future changes proposed in the transportation network that could influence the provision of a last mile service in the Innovation District in the near to long term, with the former defined as the next two to three years and the latter extending beyond that timeframe. Changes in BART, bus transit, roadway and bike and pedestrian facilities are planned. This section provides a summary of anticipated future conditions; a more detailed discussion on future roadway, bike and pedestrian facilities is provided in Appendix B.

5.1 Roadway, Bike, and Pedestrian Infrastructure

A number of improvements to roadway, bike and pedestrian infrastructure are programmed and planned for the Innovation District. These improvements are typically funded via the City's Traffic Impact Fees (TIF) program or are procured through developer obligations. The City's TIF specifies a total of over \$144 million in improvements to be completed as development occurs. Many of these improvements are identified for the Innovation District. The likely facilities for near- and longer-term implementation are listed in Appendix B.

The improvements range from basic roadway upgrades and new traffic signals to bike and pedestrian bridges to eliminate safety conflicts with auto and railroad facilities. These improvements will, like future transit service changes, need to be tracked by the future TMA, as adjustments may be necessary to shuttle routing and stops. Roadway improvements may open up better, more convenient and faster service options. At this time, however, the preliminary service routes presented are not contingent upon the improvements listed in Appendix B immediately going forward. Routes could be shortened or otherwise modified to take advantage of realized improvements and feedback from employers and riders.

5.2 BART Extensions into Santa Clara County

The 10-mile, two-station BART extension through Milpitas to east San Jose is anticipated to open for revenue service by late 2017. In the long term (10 or more years), and in light of the recent passage of Santa Clara County's November 2016 Measure B, BART service is anticipated to be extended approximately 6.5 miles to downtown San Jose and Santa Clara, adding four more stations.

It is not yet known if BART will be able to restore a full service operating plan on both the WS/SF extension and the east San Jose/Berryessa extension by the time the latter opens in late 2017. Full service by later 2018 or in 2019 appears more likely. At that point, 15-minute weekday peak and midday service will be restored on both the proposed San Jose-Fremont-Daly City and the San Jose-Fremont-Oakland/Richmond lines. In fact, somewhat higher service to San Francisco may be possible (e.g., every 12 minutes during peak periods as opposed to every 15 minutes) when BART's new train control system is implemented in the next several years. However, BART has not committed to this level of service before 2020.

The extensions of BART service into Santa Clara County are not anticipated to affect the basic characteristics of a last mile service to and from the WS/SF BART Station. The need for and benefits of improved connections from BART to the Innovation District overall will continue. The planned last mile service routes are more likely to be affected by ongoing development in the Innovation District than changes in BART service. The two areas where the extensions could impact last mile service are the home-based originations of last mile employee trips and the scheduled times of last mile vehicle trips. Some employees of Innovation District businesses living in Santa Clara will find BART and last mile service an attractive way to travel to and from work. This should increase demand for last mile commute service operating out of WS/SF BART. Depending on the volume of last mile users from Santa Clara County, scheduled last mile service connections to trains at WS/SF BART may need to be adjusted to meet train arrivals from Santa Clara County in the AM and train departures to Santa Clara County in the PM.



The future TMA or entity managing the shuttle program will need to monitor changes in travel patterns and make appropriate service adjustments as necessary. In fact, BART makes schedule adjustments periodically that affect the train arrival times and departures at stations in the system, not just when extensions are opened. These changes should be anticipated and corresponding adjustments made to last mile transportation programs.

5.3 Future Bus Transit Services and Infrastructure

AC Transit

AC Transit planners state that long-term plans for WS/SF bus service, including when BART is extended into Santa Clara County, are not yet firm. Both the BART extensions and development in the Innovation District are expected to influence future service plans. The WS/SF BART Station will continue to be a major transit hub and the focal point for intermodal bus and intermodal bus-rail-shuttle services even after BART is extended to Santa Clara County. As the Innovation District develops, AC Transit planners expect both service coverage and service frequencies to be improved in the area. District buses operating on fixed-routes (i.e., along designated arterials) could continue to serve the major activity centers. Alternatively, a new variant of bus service could be proposed to increase service efficiencies for the Innovation District, such as the on-demand flexible bus service contemplated.

AC Transit planners instituted pilot program of flexible bus service in Newark in July 2016, which includes servicing nearby zones in Union City and Fremont. AC Transit anticipates that the pilot program, funded by Alameda County Transportation Commission Sales Tax, Measure BB, could be expanded into south Fremont by the summer 2018, or sooner if enough employers in the area contribute funding and/or purchase “EasyPass” vouchers. The pilot flexible bus service, known as “FLEX,” is a marriage of fixed-route and demand responsive services and has been operating in other communities in the U.S., including Denver, Kansas City, and suburban Boston, among other locations. (VTA implemented a variant of a similar service in north and northeast San Jose and parts of Milpitas but has discontinued it, proposing more study to make it more effective if renewed.) Stops for FLEX service are defined, but routing is flexible and dynamic. Riders can track transit vehicles and call for service pick-ups using Smart Phone apps or a service web site. Transit vehicles that are assigned the service may be conventional buses or mid-capacity shuttles. The objective is to provide faster, more convenient transit service to travelers wishing to access major employment districts and activity centers.

One other expected change in future AC Transit service is the bus route segments into Santa Clara County will be discontinued once the Milpitas and Berryessa stations open as a part of VTA’s Phase 1 BART extension to east San Jose. Route 217 service to the Great Mall will be redundant with BART and no longer deemed logical or necessary to continue.

Figure 5-1: Potential Future Transit Network shows a scenario for the future AC Transit bus network in south Fremont assuming the retention of fixed-route service and realignment to serve WS/WF BART. It is based on information provided by planners in early 2016 but subject to change due to opening of WS/SF BART and other considerations.

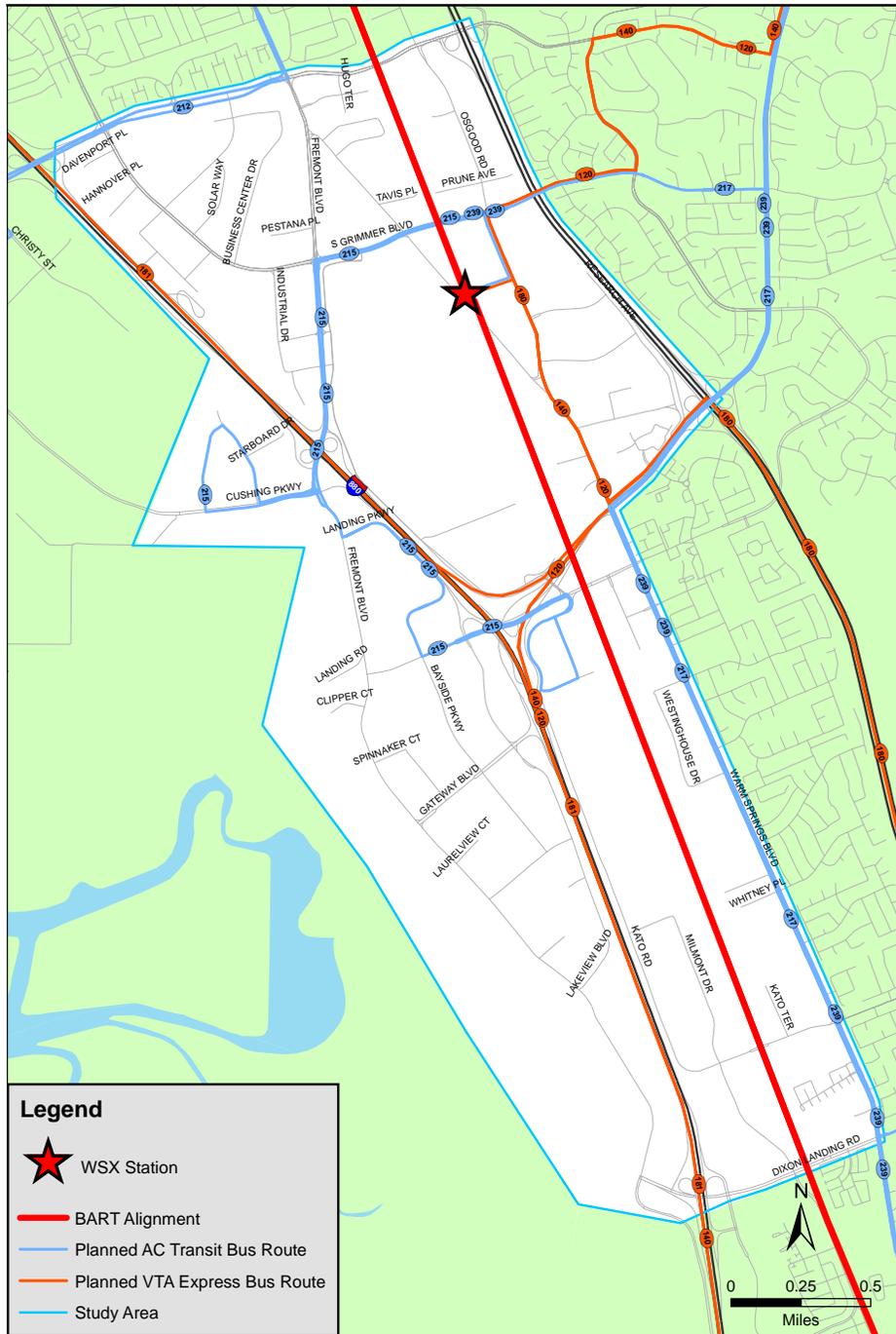
Fremont Community Development and Public Works staff must continue close contact with AC Transit planners to better understand AC Transit’s future service proposals. A future TMA and/or their appointed program manager will also need to collaborate closely with AC Transit.

VTA

Once the Santa Clara BART extension to the Berryessa Station becomes operational, a reorganization of express and local bus routes in the corridor from Fremont to east San Jose is proposed. As noted previously, VTA has not yet released plans for a new route structure, which is part of an overall systems operations analysis and route restructuring project.



Figure 5-1: Potential Future Transit Network





While Figure 5-1 shows the VTA route network first proposed for implementation with opening of the WS/SF BART Station, the plan now, according to VTA, is to eliminate most, if not all, express service operating to and from Fremont and modify other arterial routes paralleling the new BART alignment.

Freeway express service paralleling BART, including Route 180 and Route 181, will likely be eliminated, at least to the Fremont BART Station and WS/SF BART Station because of service redundancies. Routes 120 and 140, which function as feeder services to north San Jose and west Santa Clara, are anticipated to be retained in some form, except possibly terminating at WS/SF BART instead of Fremont BART. However, the service could be redesigned to operate out of the Milpitas BART Station instead of the WS/SF BART Station. Thus, there would be no VTA service within south Fremont. While, as discussed previously, VTA service is not critical to the design and operation of a last mile service in the Innovation District and surrounding areas, ongoing coordination by the future TMA with VTA planners—and all existing and future public and private transit operators in south Fremont—is recommended.

Much will depend, however, on continuing high tech development in north San Jose and Milpitas. Demand may exist for maintaining some level of VTA service out of WS/SF BART to serve I-880 and SR 237 corridor businesses—if deemed the most effective way to capture BART commuters who work in these areas. However, such a service will not have a major impact on proposed last mile access to BART for Innovation District businesses.

The fluid picture of future public transit services, both of AC Transit and VTA and possibly of other operators currently unaccounted for, points out the need for continual evaluation of a sustainable and actionable last mile service for the Innovation District. Service patterns and levels of service should not be seen as permanent; a last mile service should be flexible and capable of adjusting to respond to (and complement) changes in fixed route service within the Innovation District.



6. Last Mile Shuttle Service

6.1 Stakeholder Outreach

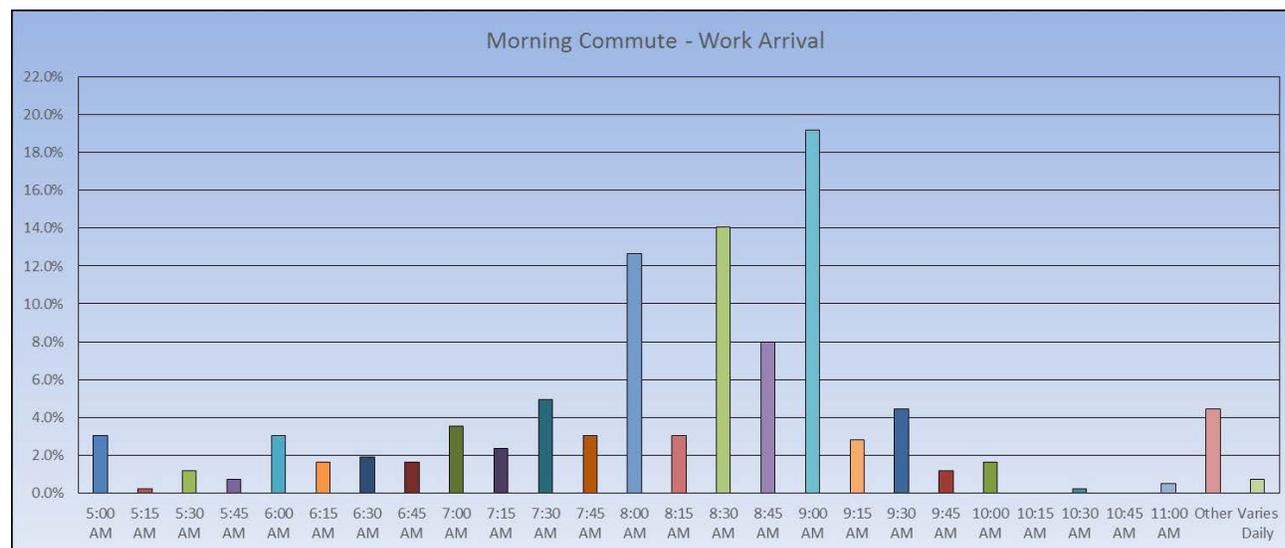
Survey and Results

The City reached out to the largest employers in the Innovation District, including Tesla, Delta, Prologis, Thermo Fisher, Western Digital, Solar City, Seagate, and LAM Research. Surveys were conducted in fall 2015 and spring 2016. A total of 429 employees participated, and the survey collected data on typical morning, lunchtime, and afternoon commute patterns as well as travel preferences. Employees indicated that they are open to commute alternatives during peak commute hours and lunch time service (11 AM – 2 PM).

Survey responses indicated that the bulk of AM arrivals occur during the traditional peaks from 7 AM to 9 AM and taper off after 9 AM. Although survey results show that some demand for shuttle service exists earlier than 6 AM (for 6 AM shift starts), existing demand may not be sufficient to warrant early morning shuttle service. Western Digital is the exception to these findings, with 10% of survey respondents arriving before 6 AM. However, any service provided to meet this early demand may need to come from the Fremont BART Station and could be provided as an add-on service if desired by the participating employer since the first BART train with direct service from San Francisco does not arrive at the WS/SF BART Station until 6:20 AM at initial opening.

Figure 6-1: Morning Commute – Work Arrival shows the approximate work arrival times provided by the survey respondents.

Figure 6-1: Morning Commute – Work Arrival

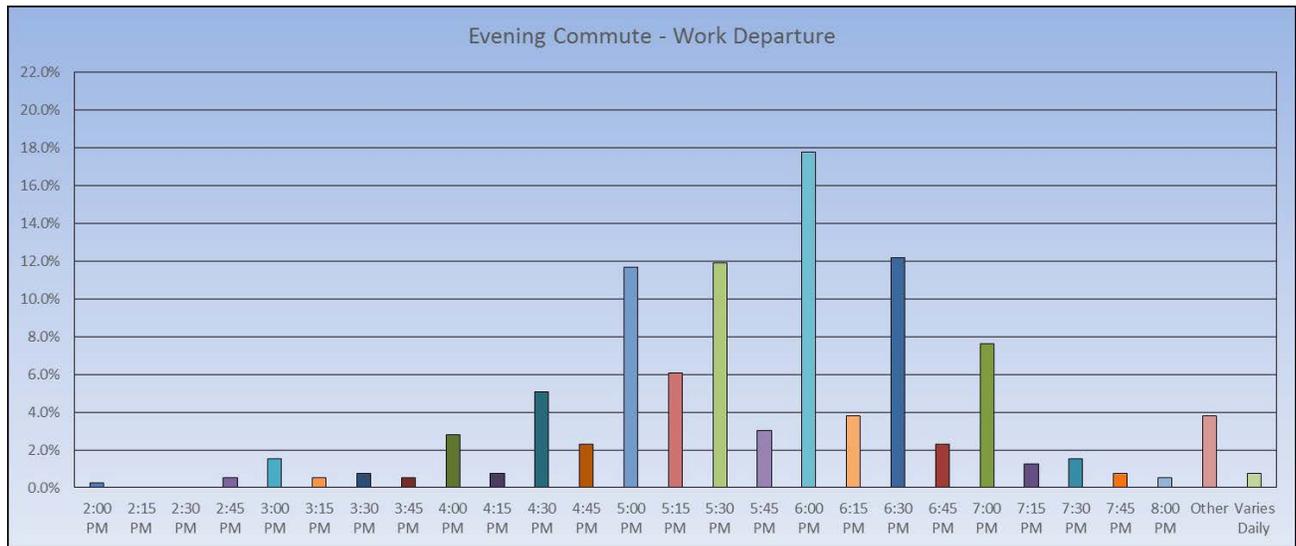




Likewise, survey responses indicated very little demand for commuter service prior to 3 PM in the afternoon. Some desire for commuter service was indicated at 4 PM, with the majority of employees surveyed leaving the Innovation District between 5 PM and 7 PM. These responses were used to develop service hours for potential shuttle routes.

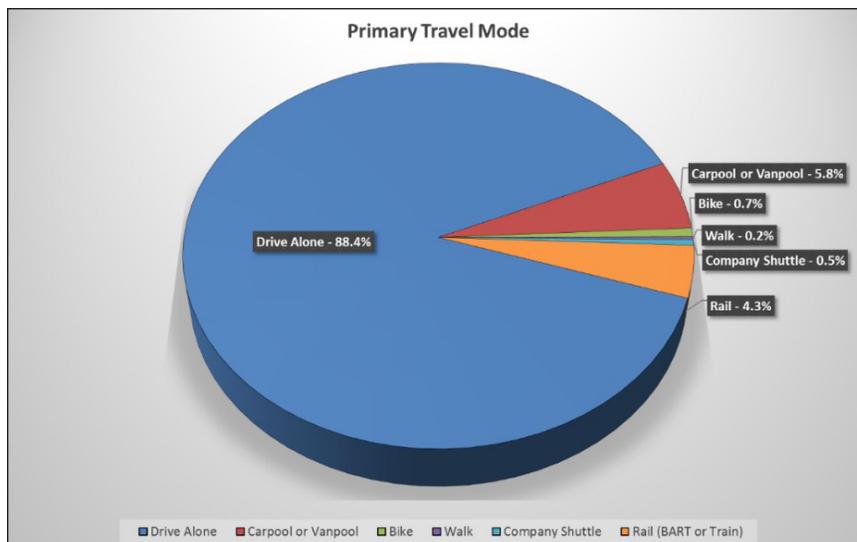
Figure 6-2: Evening Commute – Work Departure shows the approximate work departure times provided by the survey respondents.

Figure 6-2: Evening Commute – Work Departure



The primary travel mode choices indicated by the surveyed employees include the following: 88.4 percent drive alone, 5.8 percent car-pool or van-pool, 4.3 percent use rail, 0.7 percent bike, 0.2 percent walk, and 0.5 percent use company shuttles. The distribution of mode choices is shown in **Figure 6-3: Primary Travel Mode**.

Figure 6-3: Primary Travel Mode





Responses indicate that a significant percentage of the survey study group lives in zip codes located along BART corridors, and therefore could greatly benefit from the potential of a transit program serving the Innovation District. The distribution of survey responses by zip code is shown in **Figure 6-4: Zip Code Distribution**.

Stakeholder Public Outreach Meeting

A stakeholder public outreach meeting was held on January 21, 2016 at the GenZe corporate headquarters in the Innovation District. Meeting attendees indicated interest in commuter and midday shuttle routes to and from the WS/SF BART Station. The public meeting was held as an open house format and employees in the Innovation District were invited to stop by between 12 PM (noon) and 7 PM. Potential shuttle routes, schedules, survey response data, and future development plans were prepared and presented by City of Fremont, Kimley-Horn, and Silvani Transportation staff. A formal presentation on the feasibility study and potential routes was provided at three announced times during the open house. The Open House Flyer is included in **Appendix C**.

Feasibility and Opportunities

BART will provide a faster and more reliable commute option for the Innovation District employees having access to the San Francisco and Richmond lines. It may also provide a faster and more reliable commute for some employees who can use the Pleasanton and Bay Point lines, although transfers will be required. Employers with multiple locations within the Innovation District may also benefit from district-wide shuttle service routes.

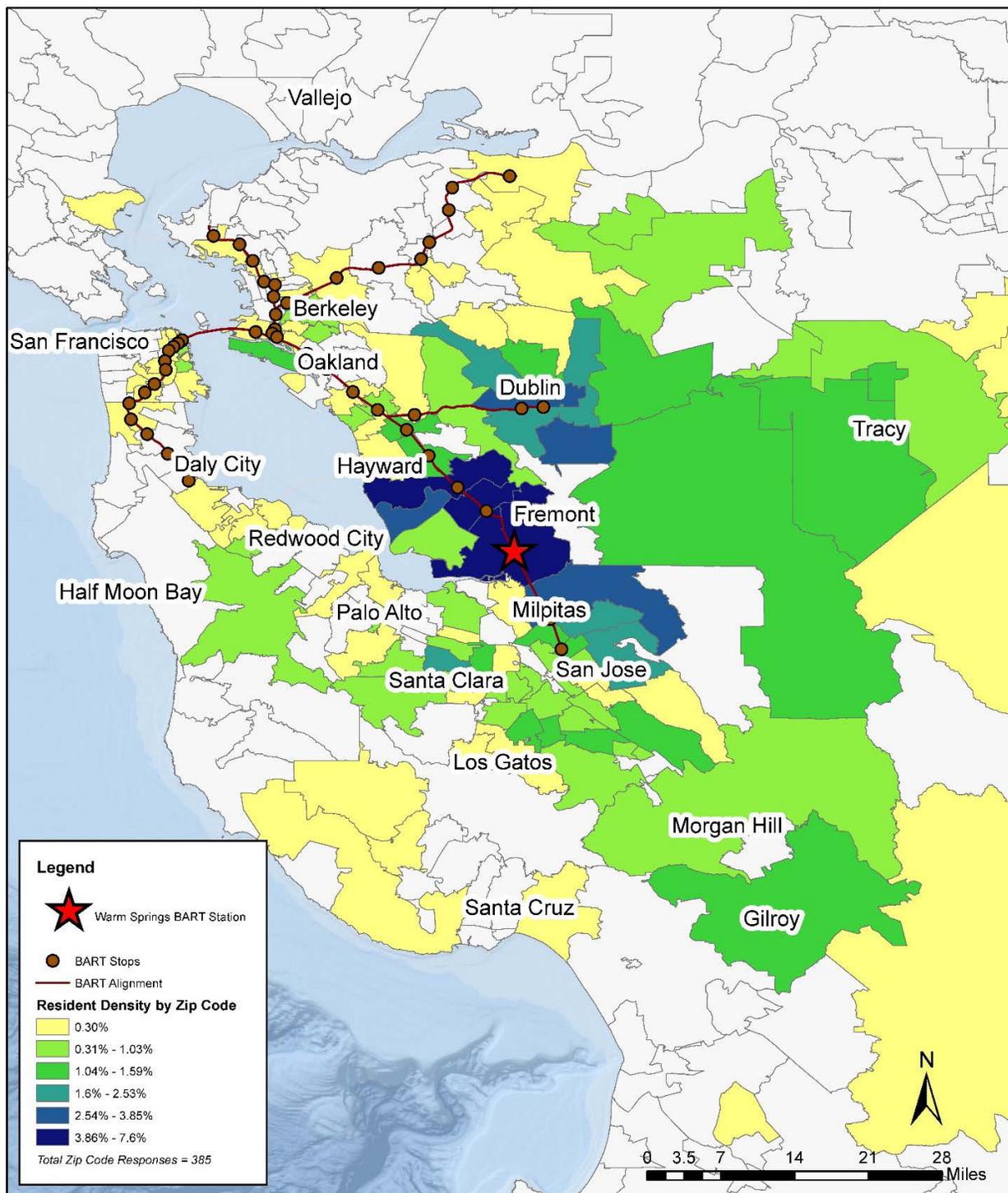
Local lunch and errand trips can be served efficiently by midday routes to Pacific Commons and to local eateries along Mission Boulevard and Warm Springs Boulevard. In addition, commuter routes to and from Pacific Commons could provide a significant benefit to Pacific Commons employees mostly working in retail jobs.

Existing employers at the outer edges of the Innovation District, and those for whom parking is already scarce (such as Lam Research and Tesla), will also benefit greatly from a last mile service.



Figure 6-4: Zip Code Distribution

Fremont Last Mile Transit Program
 Feasibility Study and Conceptual Design





6.2 Potential Routes

Introduction

This section and supplementing graphics present the potential routing and schedules for up to four peak period shuttle services and up to four midday services to serve the Innovation District. The routes can be implemented individually in a phased program of improvements or simultaneously as combinations of multiple routes. The recommendation is to proceed with a phased approach, with route expansions depending on funding and the level of employer participation. This is due to demonstrate the success of an initial service and generate increased interest among employers in expanded service, including their willingness to fund it. More discussion of the recommended implementation approach is provided in Section 7.

The service plans were shared with employers and their employees who attended a community-wide open house in January 2016. The proposed plans were developed while prioritizing the following:

- Minimize total travel time for riders (especially 'wait' time for connections)
- Maximize operational efficiencies whenever possible
- Position for flexibility (to expand routes and/or capacity as new participants join)

The shuttle service system is anticipated to evolve as use of the WS/SF BART Station expands and BART ridership increases. Based on our initial discussions with employers, the employee survey, and anticipated projections of shuttle ridership, route options were developed. As previously noted, once the BART extension into Santa Clara County opens, any last mile shuttle service will need to be reviewed again. Also, when BART changes its train schedules and acquires more rolling stock, the service should be revisited. It is anticipated that the program will grow from one option to the next as employer participation and BART ridership expand. New development currently in the pipeline will likely require route changes, as well as any corresponding changes necessary as a result of coordination with other service providers (e.g., AC Transit's anticipated FLEX service).

Proposed Routes

The eight preliminary route options serving the Innovation District represent a full service last mile program. Four of the eight routes are designed to serve morning and late afternoon/evening commuters; the other four midday routes could serve employees wishing to travel to popular lunch and retail destinations. The services can offer a comprehensive coverage of the study area. Initially, such an extensive route network is probably not warranted; both the City and consultant team perceive that phasing of last mile service is preferred. As development continues and a future steering committee or TMA is established providing more knowledge about travel patterns and preferences of potential users, the program could be expanded. A conservative and strategic approach to rolling out the program is more likely to be successful.

Whether the program has one or multiple routes, the goal remains the same: provide attractive service for, first, access to and from work and, second, discretionary travel options during the work day. This would encourage Innovation District employees to leave their cars at home.

In developing the operating and cost characteristics for the service, the assumption is all last mile routes would be operated by small bus/large passenger van shuttles. A representative vehicle is shown in Figure 6-5. Typical length is 32 feet; average capacity is 25 to 30 passengers and slightly more if allowing for limited standees.

All last mile commute period routes would originate and end at WS/SF BART Station and be scheduled to meet train arrivals in the AM and departures in the PM. Service for morning commuter routes will begin by meeting the first 6:20 AM BART train arrival from San Francisco and extend to approximately 9:50 AM. Service for late afternoon/evening commuter routes



will begin service at 4:00 PM with trains departing to San Francisco and end service by coordinating with the 7:28 PM BART train departing to Oakland/Richmond after cessation of San Francisco BART service. Initially, these are likely to be Fremont-San Francisco trains operating on 15-minute frequencies.

Timely meeting of trains provides a significant benefit to riders. In the AM, this service pattern provides the confidence that a shuttle will be waiting when riders arrive at the WS/SF BART Station, avoiding a lengthy wait time that could be caused by a missed optimal train departure at point of origin or an overall delay in the BART system (if a system-wide delay occurs, all shuttles would wait for their respective trains to arrive). This is an important factor as riders consider their total travel time. In the PM, shuttles would be scheduled to meet scheduled train departures. Normally, arrivals would not be adjusted at the WS/SF BART Station should trains go off schedule—unless the delays are predictable. When more capacity is needed for any route, additional shuttles can be added and/or the route can be split into two or more shorter routes.

The table below shows the proposed service hours for commute period routes.

Table 6-1: Recommended Commuter Service Hours

| Commuter Service | AM | PM |
|-------------------------------|-------------------|-------------------|
| Service Begins | 6:20am | 4:00pm |
| Service Ends | 9:50am | 7:30pm |
| Passenger Service Hours | Approx. 3.5 hours | Approx. 3.5 hours |
| Total Shuttle Operating Hours | 4-4.5 hours | 4-4.5 hours |

Midday shuttle routes (11 AM – 2 PM) would not necessarily originate or end at the BART station. In fact, in the concepts presented, none of the four routes serve WS/SF BART. They have been designed to provide access to retail and commercial activity centers in south Fremont during the lunch hours. Details of the proposed midday service plan are described after the discussion on the main commuter shuttle routes.

Figure 6-5: Representative Shuttle Bus (32 feet in length; 26-30 seated passengers)



Photo courtesy of Stallion Bus & Transit Company



Work Access (Commuter Shuttle) Routes (see Figure 6.6)

Route A: Fremont Boulevard, Bayside Parkway, Cushing Parkway, and Lakeview Boulevard

Route A will serve several existing employees of the Bayside Industrial subarea west of I-880, including Lam Research, Delta, and Bayside/Technology Park, as well as other potential employers along Fremont Boulevard, Bayview Drive, Bayside Drive, and Lakeview Boulevard. The route will use Warm Springs Boulevard, Warren Avenue, Lakeview Boulevard, Bayside Parkway, Bayview Drive, Fremont Boulevard, and Cushing Parkway. Route A could be potentially extended via Cushing Parkway to serve the Pacific Commons district if there is sufficient participation by retail employers and/or future development and the service is funded by Pacific Commons businesses (see “Other Potential Services”).

Two buses are recommended to travel along this route, proceeding in opposite directions (i.e., one bus leaves WS/SF BART station and follows the alignment in the clockwise direction; the other bus leaves the station and follows the alignment in the counter-clockwise direction). Even though the one-way loop time for this route is approximately 30 minutes, the maximum in-vehicle time for any rider should be no more than approximately 15 minutes if catching the proper bus.

Route A is likely an efficient alignment option and will serve many current and future employers located in the Bayside Industrial subarea of the Innovation District. From an operational standpoint, each shuttle will provide service based on a total ‘loop time’ of 30 minutes. Initial measured loop travel times ranged from 19 to 23 minutes. This provides buses with recovery time during each route to ensure on-time performance and a consistently high level of service. This conservative assumption should help make initial service more reliable. Adjustments and refinements to the route may be necessary based on employer feedback and simply due to changing future conditions in traffic and improvements to transportation infrastructure.

Route B: South Kato Road and Warm Springs Boulevard

Route B serves the center of the study area, including employees of Solar City, Seagate, as well as other potential employers along Warm Springs Boulevard. The route will use Warm Springs Boulevard, and Kato Road.

Similar to Route A, two buses are recommended to provide a directional frequency of 15 minutes along Route B and, during the service period, meet every incoming BART train in the morning as well as every outgoing BART train in the later afternoon.

Route B is also likely an efficient alignment option and will serve many current and future employers south of the WS/SF BART Station (and west of I-880). Route B would be identical to Route A from an operational standpoint, in that each shuttle will provide service based on a total ‘loop time’ of 30 minutes (with 15-minute headways) with an adequate amount of recovery time to ensure on-time reliable performance.



Route C: Osgood Road, Auto Mall Parkway, and Grimmer Boulevard

Route C serves employees of Western Digital as well as other employers along Auto Mall Parkway, Osgood Road, and Grimmer Boulevard north of the WS/SF BART Station.

This route requires one shuttle for 15-minute service. Similar to the schedule for Routes A and B, the schedule for Route C will be timed to correspond with every incoming BART train in the morning and every outgoing train in the later afternoon and early evening.

Further evaluation of Route C's potential is recommended, including contacting employers again within this subarea north of South Grimmer Boulevard. While Western Digital has expressed interest in participating in a shuttle program, based on employee arrival time data collected in surveys, many Western Digital employees arrive at work significantly earlier than other Innovation District employees. A last mile service schedule may need to be adjusted to connect with earlier BART trains to serve these employees—assuming BART operates to and from WS/SF at the appropriate times. Other employers in this subarea, including the Alameda County Water District, have indicated interest.

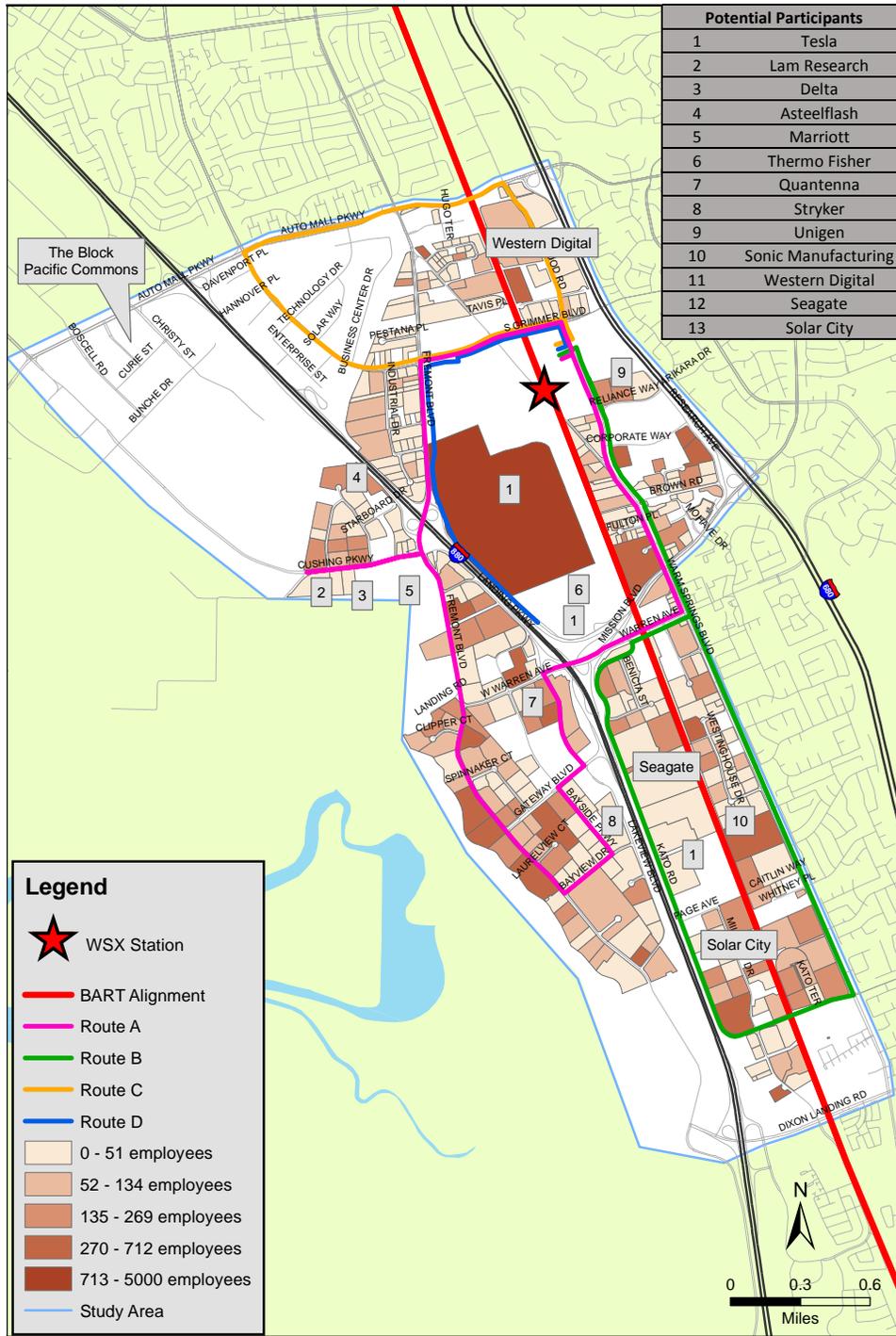
Route D: North Kato Road

Route D primarily serves employees of Tesla and ThermoFisher. The route is proposed to use Warm Springs Boulevard, Grimmer Boulevard, and Kato Road.

This route will require two shuttles for 15-minute service. Similar to the schedule for Routes A and B, it will be timed to meet AM BART train arrivals and PM departures. Route D can be possible with Tesla and Thermo Fisher's support and participation. Initial meetings with these employers have been positive, but have not led to a firm commitment.



Figure 6-6: Full Service Routes A, B, C and D





Other Potential Services

The four commuter routes described above serve the south Fremont area, focusing on employee access to the larger employers of the Innovation District. South Fremont includes other commercial/retail areas that have sizeable employee populations and generate substantial traffic. These other activity centers have not been overlooked in the consideration of last mile service; however, they are not considered as promising for travel market penetration by a shuttle service during peak commute hours to and from WS/SF BART but could be included if adequate employer participation is realized.

A case in point is the Pacific Commons retail district, west of I-880 and accessible primarily from Auto Mall Parkway. It is the City's most prominent retail district. The multitude of land uses at Pacific Commons generates strong employment opportunities as well as substantial traffic for shopping and related activities. However, a last mile program providing services during peak commute hours may not best serve retail uses since typically employment is dispersed and work hours (shifts) are highly variable, even at individual businesses. This is the nature of retail employment. Parking is free and widely available for employees as well as shoppers and other visitors to the Commons. Retail shoppers frequenting large box retail and anchor stores in the Commons are difficult to attract to essentially a transit service.

In the longer term, the area may grow to include more mixed-use commercial development at higher employment intensities, and adjacent new commercial development south of Pacific Commons on undeveloped land may occur and participate in an established program. A future TMA should continue to evaluate these changes and employment trends. Further discussions with property management teams representing the Commons and potential new development should persist. At some point a targeted last mile service, supplementing existing and proposed public transit service, may be warranted. While presently there appears to be a limited market for an employee shuttle serving Pacific Commons, service could be extended, for instance as a modification of Route A, if retail/commercial employer and/or new development participation, including funding, is sufficient.

Recommended Commuter Service Rollout

Case studies show that the most effective transportation demand management (TDM) programs are managed by associations formed by business communities and property owners. More often than not, boards of TMAs are comprised of their members/users, commuter representatives, key stakeholders, and typically include participation by the city, transit and other mobility providers.

Because the Innovation District represents a large service area (nearly 4 square miles) and includes a diverse mix of small, medium and large-sized employers, rollout of a full-service transit program with a private shared-services funding model would be challenging. A conservative and strategically phased approach to rolling out the program based on demand is more likely to be funded and would ensure shorter headways. A good start would be to leverage participation of large employers and property owners in each sub-area to build momentum towards greater participation and support to include medium and small employers that could benefit from a shared-services program.

As the Innovation District builds out and greater participation is reached, the shuttle program could be adjusted and expanded. The four-route shuttle system presented represents a full-service program which could take longer to implement. A privately-funded and operated transit program by a TMA offering an initial pilot or limited service has the advantage of limiting cost exposure for the program, including the cost risk shouldered by the future TMA. The service would operate initially as a demonstration service, and changes could be made more easily than for a more expansive shuttle system. The lessons learned from operating the initial service would inform the process for expanding services or adding a second route or multiple routes.



A potential disadvantage of limited service deviating from the routes suggested is that some riders may have somewhat circuitous travel to reach their destination, which could increase travel time. Travel time to all service locations along each of the routes proposed in this report is anticipated to be approximately 15 minutes or less—that is, the in-vehicle travel time on a route required to reach any stop along the route is less than 15 minutes. Research has shown that riders find the time waiting for a transit connection more of an inconvenience than the time spent riding in the transit vehicle. Thus they will accept slightly longer on-board travel time if the wait or transfer time is reduced. Given the desire for efficient use of financial resources, the ability to meet every BART train hinges on the ability to serve multiple destinations.

The four-route plan is intended to maximize ridership and provide an excellent level of service to all corners of the Innovation District. To warrant implementation the plan will require full participation by the majority of employers in each sub-area.

It is important for strong commitments from employers before any service plan moves forward.

Midday Lunch and Retail Routes

Survey responses and personal interviews indicated interest in having a midday shuttle service to nearby restaurants and retail destinations. The provision of a midday service options provides greater flexibility and freedom to employees. This may also encourage employees to use the shuttle program if additional flexibility is provided by midday services, such as during the lunch hour. By providing a midday transit options, employees will have increased flexibility to access lunch and shopping destinations without having to use their personal vehicle. This can include van pools, car-sharing or bike-sharing programs, or even a midday shuttle service if other public transit options are not available.

If a midday shuttle service is determined to be beneficial, the following midday schedule could be implemented to operate from 11 AM to 2 PM with buses running every 30 minutes on one or more of the four midday routes to Pacific Commons and other nearby popular destinations. This service can be implemented in the same phased manner as commuter service, in the following order:

- **Route E:** Bayside Parkway, Bayview Drive, Fremont Boulevard, and Cushing Parkway to Pacific Commons (and The Block)
- **Route F:** Osgood Road, Auto Mall Parkway, Grimmer Boulevard, Fremont Boulevard, and Cushing Parkway to Pacific Commons (and The Block)
- **Route G:** North Kato Road, Fremont Boulevard, Auto Mall Parkway, and Cushing Parkway to Pacific Commons (and The Block)
- **Route H:** South Kato Road, Warm Springs Boulevard, Warren Avenue, Fremont Boulevard, and Cushing Parkway to Pacific Commons (and The Block)

Midday ridership potential of a shuttle service is hard to estimate. The trips are discretionary compared to work trips that are essential. Thirty-minute frequencies require careful scheduling of trips by employees, otherwise the lunch hour will run long if a shuttle is missed. This will discourage riders. More frequent service would be more attractive but is deemed to be too expensive relative for the potential rider market.

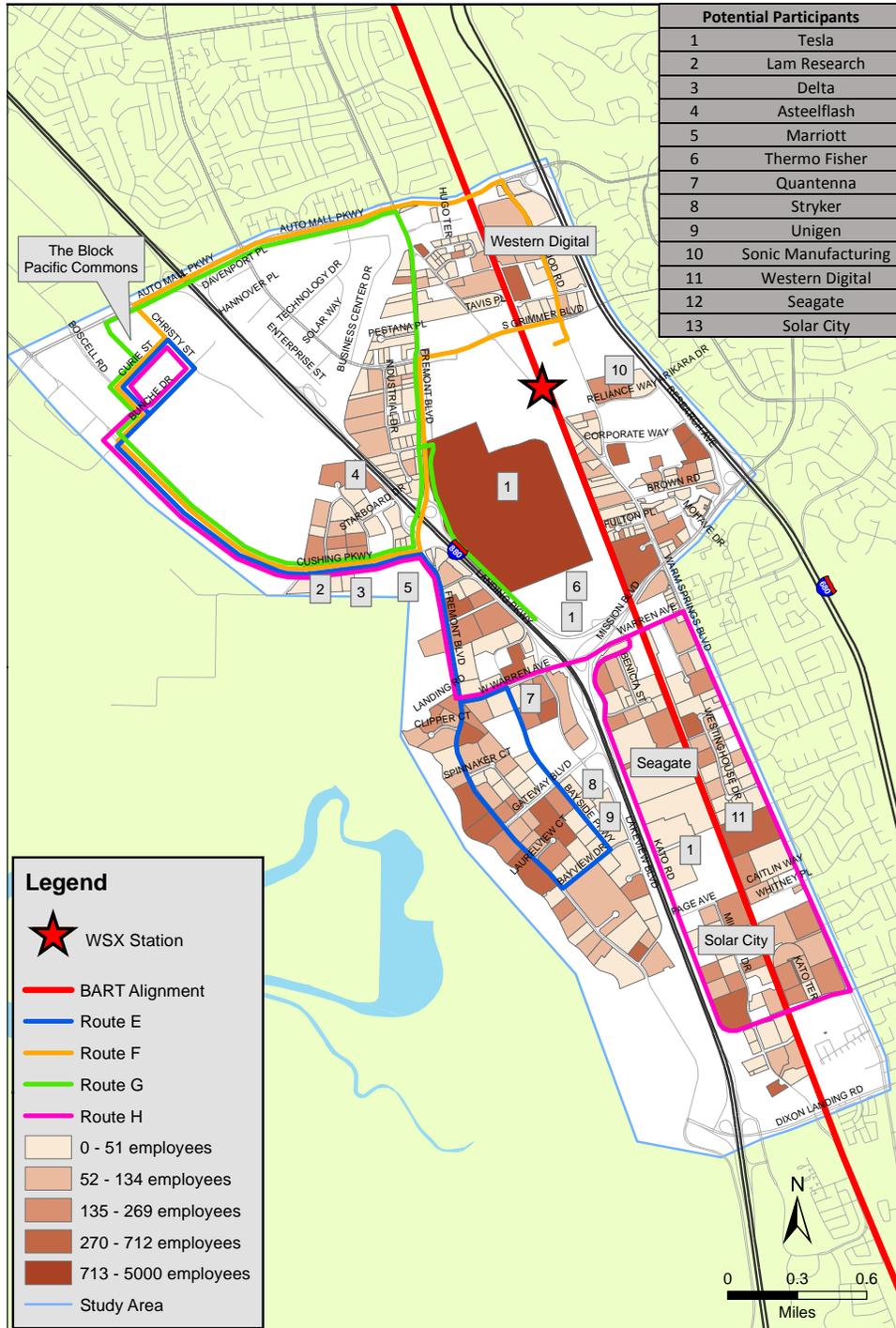


For these reasons, midday service is a longer-term consideration and should be compared to other alternatives for providing Innovation District employees access to retail and other commercial businesses during the work day. The other alternatives would include employer-based car share programs, subscription-based transportation service programs (e.g., MaaS—“Mobility as a Service”) made available to employees through their employers, pooled rideshare service possibly subsidized by employers, and other flexible transportation services. Should AC Transit decide to implement Flex bus in south Fremont, where reservations are requested in advance to allow employees along a defined route to access a selected destination at a specific time, its potential to serve the midday travel market should be considered. If other alternatives are viable, the last mile program could avoid incurring a significant cost from expanding shuttle operations to outside of commute periods. The matter is recommended for follow-on conversation with businesses who first decide to participate in the commuter service element of.

Proposed mid-day routes are shown in **Figure 6-7: Mid-Day Routes**.



Figure 6-7: Mid-Day Routes





6.3 Potential Shuttle Costs

Commuter Service

Potential annual operating costs of a full four-route commuter service are summarized in Table 6-2. For example, the estimated annual cost to operate Route A is estimated to be approximately \$350,000. The annual cost of a two-route service could be approximately twice that for Route A—\$700,000. To operate all four shuttle routes 242 weekdays per year could cost approximately \$1.2 million. These estimates are provided in today’s dollars (2016) and are exclusive of other program administrative costs. The administration of a program would cost approximately 15 to 20 percent of the annual service operating costs for a one or two-route shuttle program and 5 to 10 percent of a three or four-route program.

Table 6-2: Estimated Budget for Commuter Routes

| Route | # Vehicles | Daily Commute Hours | App. Daily Commute Cost ¹ | Commuter Annual Cost ² |
|---|------------|---------------------|--------------------------------------|-----------------------------------|
| Full Service—Four Shuttle Routes | | | | |
| Route A | 2 | 8 | \$1,440 | \$348,480 |
| Route B | 2 | 8 | \$1,440 | \$348,480 |
| Route C | 1 | 8 | \$720 | \$174,240 |
| Route D | 2 | 8 | \$1,440 | \$348,480 |
| Total All Services | 7 | 32 | \$5,040 | \$1,219,680 |

1. Based on a \$90/hour operating cost
2. Based on 242 operating days per year.

These costs can be quite variable, however, and increase substantially depending upon the level of marketing, ongoing stakeholder outreach, and program planning for service changes and expansion that the future TMA undertakes. Recognizing that the City of Fremont is not in a financial position to fund these costs, it is recommended that the program management be funded and managed by a TMA consisting of members, that is, businesses and property owners actively served by shuttle service.

² For this study, a shuttle bus hourly rate of \$90 is assumed for operating and maintenance costs (or, simply, operating costs). This is a representative unit cost based on other, existing shuttle operations in neighboring communities similar to the program recommended in this report. It includes fuel and all vehicle-related maintenance and depreciation costs plus driver and other labor costs by a private transportation services provider.



Midday Shuttle Service

Last mile annual operating costs for midday shuttle service in south Fremont are shown in Table 6-3. A simple, single route service complementing, for instance, last mile commute service on Route A, is estimated to cost approximately \$87,000 annually. A four-route midday service complementing all four commute routes in Table 6-2 could cost approximately \$350,000 annually. The annual cost of each midday route is basically the same since each route shares the same operating characteristics: 30-minute service provided by a single shuttle vehicle.

| Route | # Vehicles | Daily Commute Hours | App. Daily Commute Cost ¹ | Commute Annual Cost ² |
|---------------------------|------------|---------------------|--------------------------------------|----------------------------------|
| Mid-Day Routes | | | | |
| Route E | 1 | 4 | \$360 | \$87,120 |
| Route F | 1 | 4 | \$360 | \$87,120 |
| Route G | 1 | 4 | \$360 | \$87,120 |
| Route H | 1 | 4 | \$360 | \$87,120 |
| Total All Services | 4 | 16 | \$1,440 | \$348,480 |

1. Based on a \$90/hour operating cost.
2. Based on 242 operating days per year.

Should both commute and midday service be operated, the costs are additive. For example, the combined Route A commute and complementary Route E midday service could cost approximately \$440,000 annually, for instance.

Operating Revenues/Program Funding

Shuttle service can be funded in a variety of ways, ranging from an entirely privately-funded service by the beneficiaries (property owners/employers) to an entirely publicly-funded service by the project sponsor (e.g., the City or a public transportation agency), or a hybrid of the two is also possible.

The preferred funding source for a last mile service in the Innovation District would appear to be either totally private, based on participating employers and property owners agreeing on a shared-services funding model (e.g., on a per square foot basis of space occupied), or a hybrid system, based on a business tax or property-based assessment and improvement district (PBID). The preference for private funding is due to the short timeline in which a service is proposed for implementation, the stable funding base, and the fact public revenue sources are unavailable, limited and/or substantially committed to other needs, including transportation infrastructure improvements in south Fremont.

The future TMA should direct additional studies required and offer its recommendation on possible funding mechanisms. Should private funding be the selected mechanism, the TMA would then develop funding agreements, such as transportation services agreements, with last mile service participants. If a hybrid system is proposed for the City's consideration, the TMA would have to provide technical assistance to the City in establishing the tax or assessment rates.

The sections that follow discuss various funding sources that could be considered for the Innovation District.



Private Sources

At the start, a funding plan for the shuttle program must be developed. Private funding for start-up and initial operations should be obtained from contributions made by property owners/employers participating in the system. Allocation of specific costs should be determined based on levels of participation in the various routes and services. It is anticipated that participants (i.e., property owners and employers) on each route would contribute to the specific route(s) and services they are using. Property owners/employers could contribute on a shared-services funding model (per square foot basis of space occupied). Transportation service agreements can be drawn up between the participants (employers and property owners) and their TMA to fund a transit program.

Private funding for the purposes described in this report is usually the most stable source over the long term and allows for much greater flexibility, local control and likely earlier implementation. Changes in a last mile service based on private funding can be made quickly, if needed. The potential risks to private funding are collecting from multiple sources or participants, which can be cumbersome and time-consuming for program management. Late payment or non-payment can threaten the viability of the service by creating cash flow problems.

For the Innovation District, the TMA should include large firms (e.g., Tesla, Solar City, Western Digital, Lam Research and others), large multi-tenant complexes (e.g., Bayside Business Park), and developers/owners of large retail centers or of multi-use activity centers (e.g., Pacific Commons). However, there can be challenges in obtaining a high level of participation as well as commitments to support a program for some reasonable period. A minimum period, for instance, would be at least two years, and preferably commitments should be at least five years, which usually serves as the minimum contract period for a transportation service provider.³

Public Sources

Start-up may require initial outlays, including one-time costs that can be obtained from sources different than those used to fund ongoing operations. Public grants may be used to purchase equipment and defray the administrative costs required to establish the foundation for a service. They may also be used to offset a portion of the typically higher operating costs during the first two to three years of operation when ridership and financial support from participants may be growing. Potential grant sources may include state (Caltrans) and regional (Metropolitan Transportation Commission) grants. However, at the time of the writing of this report, there are no grant funding sources for purely start-up last mile shuttle programs.

Grant funding may reduce the initial costs for each participant and provide incentive to join a last mile service program. The single vehicle trip reduction and bicycle and walking mode of travel may qualify for Active Transportation Planning (ATP) funding administered by Caltrans. Funding may also become available through the Metropolitan Transportation Commission (MTC) grants and California Clean Energy Grants. If the TMA wishes to implement automated vehicle technology on the route, private and public funding resources may become available, similar to one provided for the Bishop Ranch office development in San Ramon, CA. Most grant funding, however, is currently earmarked for low income communities, including the MTC Lifeline Funds and much of ATP grant funding. The Innovation District would not qualify under any of those grants.

Public funding often comes with strict requirements as to its use; administrative costs to obtain and then spend the funds can be high. The elapsed time from the application for funding to award can be lengthy. Public funds will often be restricted in time and reapplication necessary to extend the funding stream, if that is even possible, and can be subject to political volatility.

³ Shorter contract periods would likely be bid at much higher cost since vehicle costs cannot be fully amortized and short-term professional labor would be difficult to find.



Business Tax or Property-based Assessment and Improvement District

A hybrid funding approach can be considered to support shuttle operations. However, this approach involves the city in that private participants paying for service do so through public means such as a business tax or property-based assessments and improvement districts. The assessments are stable sources of funding. For example, property-based assessments are paid whether a property is occupied or not.⁴ Business assessments are a good source of revenue in a dynamic, growing area such as the Innovation District but they are collected based on occupancy and pursuant to business improvement district legislation, these districts must be renewed annually.

Both specific business tax levies and PBID taxes require approval by a majority vote (50% + 1) of those potentially affected (e.g., businesses or property owners). The City of San Leandro LINKS, which offers a fare-free shuttle connection between the San Leandro BART station and much of their industrial employment area, is funded through a city-collected business tax. On the other hand, the City of Emeryville's Emery-Go-Round, which also provides a fare-free service to and from MacArthur BART station to various destinations within Emeryville, is funded through a PBID. In both cases, funds are collected and passed through to their respective TMAs. If a petition for business tax or property-based assessments is sought, it must be considered by the City Council and the assessment district must be established through a public hearing process.

A property-based improvement district (PBID) is a common method of funding a shuttle program. Participants are charged based on square footage and type of use (e.g., office, manufacturing or warehousing). Two longstanding successful funding models, Emery-Go-Round in Emeryville and Mission Bay Shuttle in San Francisco, are funded based on property type and size. Both have commercial rates for office/retail and a lesser rate for industrial/manufacturing. Both also have residential rates that are calculated on a per-unit basis for each residential property.

Because most Innovation District employers have 'blended' uses (i.e., commercial and industrial), a similar-tiered cost structure as employed by the Emery-Go-Round and Mission Bay Shuttle could be suitable to fund a similar shuttle program. This structure would assess higher density office space at a 'full' rate and lower density manufacturing square footage at a lesser rate.

By way of example, two scenarios are shown below to illustrate how revenue could be generated by assessing land uses in the Innovation District a shuttle participation fee on a per square foot basis:

1. *Scenario No. 1:* 100 percent participation by all commercial and related uses (e.g., retail) and 100 percent participation by all industrial uses. Fees for commercial and related space are twice that of fees on industrial uses.
2. *Scenario No.2:* Lower 50 percent program participation rate by industrial land uses. The lower fee revenues from industrial uses are offset in part by a higher participation fee on commercial land uses equal to three times the rate for industrial space.

⁴ An agreement with the City or another entity authorized to receive and pass through public funds would likely be required to implement a PBID. The funds are collected and transferred typically twice a year, in spring and summer. Alameda County would charge a collection fee and, if the City then passes through the funds to the TMA or other transportation entity managing the program another handling fee is typically charged. Thus, the full property assessment would not be received by the TMA or entity.



Under Scenario No. 1 a full-service fare free shuttle program, including four peak period routes connecting WS/SF BART with the majority of businesses in the Innovation District, is estimated to cost approximately \$1.4 million annual to operate and administer. A commercial land use fee of \$0.10 per square foot and industrial land use fee of \$0.05 per square foot would generate about \$1.5 million annually and cover the operating costs. These fees assume approximately 2.2 million square feet of commercial space and 25.4 million square feet of industrial space would be subject to the assessment timeframe, which would be determined by the TMA. They also assume all commercial and industrial uses would participate in the last mile program. These rates are currently being used by other Bay Area shuttle service programs (e.g., Mission Bay and Emeryville).

Under Scenario No. 2, should participation rates be lower, fees would likely not be adequate to cover the costs of a four-route shuttle system. For example, if only 50 percent of industrial land uses are covered by the fee program and the commercial fee assessment is increased to \$0.15 per square foot in order to offset a portion of the lost revenue, annual revenue would be just under \$1 million, falling significantly short of the \$1.4 million annual costs for a four-route system. The revenue would, however, be sufficient to cover the operating cost for a smaller two-route system, estimated to be \$0.7 to \$0.8 million. Participation rates of businesses and developers are key.

Scenario No. 1 is estimated to generate sufficient annual revenue to cover the cost of a four-route fare free commuter last mile shuttle. Scenario No. 2 would not generate sufficient revenue for a four-route fare free service but would likely cover a two-route fare free network. Participation rates are critical and must be established as accurately as possible before proceeding with the implementation of a last mile program. Lower participation rates would be expected if shuttle service area coverage is less.

The fee scenarios shown are just two of the possible formulas (operating cost divided by square footage) that can be considered. Generally, it is advantageous to base participation on a formula that is easy to understand and calculate and not subject to constant changes. The property tax rolls, augmented with data from the city that may not yet be recorded by the county, is largely accepted as one of the most accurate sources upon which to base an assessment. Levies that stem from square footage and use data provide greater stability and reliability.

Other funding models are based on head count, relative size of each participant to the whole, or flat fees negotiated as part of development agreements. None of these are recommended, as they are constantly changing variables (e.g., head counts are prone to relatively sudden decreases and increase) and subject to much interpretation and little data. However, some shuttle funding models have adopted similar program assessments based on employee head count.



7. Last Mile Shuttle Service Program Implementation

The following section provides a recommended process for implementation of a last mile program for the Innovation District.

7.1 Engage Employers and District Property Owners

Engaging employers will be critical to the success of the new shuttle service. Ultimately, they are the decision-makers for establishing service levels, budgets, branding, marketing, vendor selection, and operational oversight. Because obtaining support from a broad spectrum of participants is so important to the overall long-term quality and level of service standard, an active and ongoing employee engagement program is necessary. The more employers (and square footage) participating, the lower the costs will be for everyone and the more improved the service is that can be provided.

Employers Who Already Operate Shuttles

A good business case can be made to enlist the support of those employers who already operate their own shuttles. The new Innovation District network can provide many benefits to these companies:

- They can re-deploy existing services to serve other transit hubs or origins.
- In most cases, costs will be lower than they are currently paying and the level of service will be higher.
- By sharing both costs and vehicles, operational efficiencies increase, which makes programs easier to justify for sustainability and accrue to the overall ‘footprint’ and being engaged in the local community.
- In some cases, they can gain new services (e.g., potential midday) because of participation.
- Many are already facing severe parking shortages and need to add to existing shuttle programs.

Employers Who Do Not Operate Shuttles

Many of the smaller-to-medium-sized employers that have been approached regarding a potential shuttle service recognize the value that can be provided to their employees. The costs of participating will play a big role in determining which employers can participate. Benefits to these potential participants include:

- The provided service is perceived as a valuable employee benefit.
- Coupled with offering pre-tax transit deductibility, employers have an instant employee benefit to offer.
- Increasingly, transportation is a key factor in employee recruitment and retention.
- While on-site parking is not a motivator for many, offering employees a more reliable and faster commute is.
- Savings in costs gained by an increased level of participation in a shared shuttle program.

Incentives exist and will continue to increase for employers to encourage employees to use transit and other non-auto modes to access the work place. The City will be commencing preparation of a comprehensive TDM plan for the Innovation District, which includes portions of the last mile service study area. The TDM plan will include measures to reduce auto traffic and reinforce the traffic mitigation goal of the Final Environmental Impact Report certified for the Community Plan. This Plan requires that employers within the core area of the Innovation District reduce peak period auto trips by 20 percent. Participation in a shuttle program would be an option for employers required to meet that goal.



7.2 Transportation Management Association

The business community will significantly improve transportation options available to its employees, customers and the community through establishment of a transportation management association (TMA). TMAs are partnerships that draw their membership from local employers, property owners, and others interested in working together to address transportation needs, such as a last mile challenge. Their mission is to reduce single occupancy vehicles by collaborating together to encourage the use of alternative transportation options such as shuttles, vanpools, carpools, and public transit. TMAs are fundamental to providing TDM services that have greater impacts and benefits through shared-services. Appendix F outlines the steps in forming a TMA for a last mile transit program.



8. Conclusions

The opening of the new WS/SF Fremont BART Station will significantly change travel patterns for residents and employers in Fremont and the surrounding area. The Station is centrally located in the Innovation District, and provides an ideal opportunity for a last mile transit program to serve existing and future employers.

The implementation steps described in this study would allow an interim TMA to form a legal TMA entity. Once established, the TMA would allow their members to combine resources in order to implement specific last mile transit options that best address their needs, making the overall cost to each member affordable while providing a valuable commuter service to all of their employees. As described in this study, a privately-funded transit program, including a shuttle service managed and operated by the TMA is an effective option to accomplish that goal.

The City will continue to reach out to the employers and property owners in the Innovation District and help in the formation of a TMA. In the early stages, the City can help lead the interim TMA, grow a core membership, and assist with funding grants for transit services as they become available. Partnering with anchor employers on a privately-funded shared-services transit program will stimulate increased participation by others. While implementation of initial services offered by the TMA is expected to occur in stages, the transit program can be adjusted as membership grows, offering new or expanded services as it matures. Technology applications should also be considered for convenience and efficiency of services, as many options are available and improvements and advancements in this field are becoming more apparent.

The TMA should work with the City on eliminating activity-based infrastructure gaps, such as improving pedestrian and bicycle facilities to ensure application of its transit program to the fullest extent practicable. Commuters should be able to walk or bike from the Station or a shuttle stop to their place of employment in a safe and efficient manner. Implementation of the City's pedestrian and bicycle plans will help resolve this shortfall within the public right of way; however, some private property improvements may also be needed to complete connections.

A successful last mile transit program operated and managed by a TMA will provide several benefits that go beyond addressing the primary issues related to traffic congestion and impacts on air quality and global warming caused by single-occupant automobiles. From pooling resources together to save money on shared services to providing alternative transportations options for the retention and recruitment of the "best and brightest," employees will be happier, healthier and ready to be productive in this innovation ecosystem.



9. Sources

<http://nextbus.cubic.com/About/How-NextBus-Works>

Fremont Pedestrian Master Plan

Fremont General Plan

Fremont Advanced & Sustainable Technology (FAST) - Center for Innovation Strategy

Lennar Area 4 Master Plan

Old Warm Springs Boulevard South Master Plan

Toll Brothers Master Plan

Warm Springs/South Fremont Community Plan

<http://www.bart.gov/about/projects/wsx>



Appendix A

Existing Roadway, Bike, and Pedestrian Infrastructure

Highway Characteristics

Interstate 680

I-680 is a six-lane north-south freeway connecting San Jose and Pleasanton to the Innovation District. Major connectors include I-580 to the north and I-280 and US-101 to the south. The posted speed limit on I-680 is 65 miles per hour (mph) and ramps at Auto Mall Parkway and Mission Boulevard provide direct access to the interstate for the study area.

Interstate 880

I-880 is an eight-lane north-south freeway connecting San Jose, Oakland and the East Bay to the Innovation District. Major connectors include I-580 to the north and I-280, US-101, and Highway 17 to the south. The posted speed limit on I-880 is 65 mph and ramps at Auto Mall Parkway, Fremont Boulevard, Warren Avenue / Mission Boulevard, and Dixon Landing Road provide direct access to the interstate.

City Street Characteristics

Warm Springs Boulevard

Warm Springs Boulevard is also known as Milpitas Road south of Dixon Landing Road, Osgood Road north of Grimmer Road, and Driscoll Road north of Washington Boulevard. It is a north-south arterial extending from Mission Boulevard at the north end and to Landess Avenue at the south end (in Milpitas). It is primarily a four-lane divided arterial in the study area and is an important roadway connecting Innovation District employees and residents to local businesses, schools, churches, and restaurants. The posted speed limit is 45 mph in the study site vicinity.

Fremont Boulevard

Fremont Boulevard is a north-south arterial extending from Dixon Landing Road at the south end of the Innovation District to north Fremont. It is primarily a four-lane arterial with a two-way left turn lane south of the I-880 ramps and a four-lane divided roadway north of the I-880 ramps in the study area. Fremont Boulevard primarily connects the Innovation District to residential areas and I-880. The posted speed limit is 45 mph in the study area.

Auto Mall Parkway

Auto Mall Parkway is an east-west arterial extending from the undeveloped area west of Cushing Parkway to Mission Boulevard in the east. The roadway's name changes to Durham Road east of I-680. It is a two-lane undivided roadway west of Nobel Drive, a four-lane divided roadway from Nobel Drive to Cushing Parkway, a six-lane divided roadway from Cushing Parkway to Grimmer Boulevard, and a four-lane divided roadway from Grimmer Boulevard to Mission Boulevard. Auto Mall Parkway provides the Innovation District employees a route to Pacific Commons, including The Block. The posted speed limit is 45 mph in the project area.

Cushing Parkway

Cushing Parkway is a north-south arterial extending from Fremont Boulevard to Thornton Avenue. Its name changes to Boyce Road north of Auto Mall Parkway and Cherry Street north of Stevenson Boulevard. It is primarily a six-lane divided arterial between Fremont Boulevard and Northport Loop West and a four-lane arterial from Northport Loop West to Thornton Avenue. Cushing Parkway provides Innovation District employees a direct route to retail and restaurants located in Pacific Commons. The posted speed limit is 45 mph in the study area.



Grimmer Boulevard

Grimmer Boulevard is an east-west arterial in the study area vicinity. It extends from residential land uses east of I-680 through the north end of the Innovation District and up to residential uses north of the Innovation District. It is primarily a four-lane divided arterial in the study area and is an important roadway because it connects residents with Innovation District businesses and major arterials, including Fremont Boulevard and Osgood Road/Warm Springs Boulevard. The posted speed limit is 40 mph in the study area.

Bayside Parkway

Bayside Parkway is an approximately one-mile, north-south local collector also known as Landing Parkway north of Warren Avenue. It is a four-lane roadway with a two-way left-turn lane south of Warren Avenue and a two-lane roadway with a two-way left-turn lane north of Warren Avenue. It joins Fremont Boulevard at its north end and the posted speed limit is 35 mph.

Pedestrian Infrastructure

The existing sidewalk network was evaluated in summer 2015 via a site visit and review of Google Earth aeriels. Segments without existing sidewalks are split into two sections “No Existing Sidewalk (Developed)” and “No Existing Sidewalk (Undeveloped)”. **Figure 4-1: Existing Sidewalk Infrastructure** in the body of this report shows graphically existing sidewalks and gaps in the network.

Existing Sidewalks

The existing sidewalk network in the Innovation District is extensive along roadways with developed frontages. Sidewalks are present in much of the Bayside Parkway area (or Bayside Industrial subarea) and along Fremont Boulevard, Warm Springs Boulevard, Cushing Parkway, Grimmer Boulevard, Warren Avenue, and Auto Mall Parkway, as well as many other local collector and secondary streets.

Gaps in Existing Sidewalks

Frontages Adjacent to Undeveloped Properties

Existing sidewalk gaps along undeveloped frontages are expected to be filled once the adjacent property is developed. Gaps exist along Auto Mall Parkway, Technology Drive, Business Center Drive, Fremont Boulevard, Grimmer Boulevard, Lopes Court, Tavis Place, Warm Springs Boulevard, Reliance Way, Corporate Way, Brown Road, Kato Road, and Dixon Landing Road.

Frontages Adjacent to Developed Properties

Existing sidewalk gaps along developed frontages will be filled in the future through the City’s Traffic Impact Fee (TIF) program and when redevelopment occurs. Notable gaps exist along Fremont Boulevard, Grimmer Boulevard, Kato Road, Warm Springs Boulevard, as well as other local roadways as shown in the following figure.

Bicycle Infrastructure

Bicycle facilities are divided into three classes. Class I bike paths are physically separated from motor vehicle lanes and offer two-way bicycle travel. Class II bike lanes on roadways are marked by signage and pavement striping. Class III bike routes share the travel lane with motor vehicles and only have signs to guide bicyclists on recommended routes. Existing bike facilities and gaps in the network within the Innovation District are shown in **Figure 4-2: Existing Bike Infrastructure** in the body of this report.



Warm Springs Boulevard

Class II bike lanes exist along both sides of Warm Springs Boulevard from Auto Mall Parkway to Dixon Landing Road (at the Fremont/Milpitas city-limit line).

Fremont Boulevard

Class II bike lanes exist on both sides of the road from Auto Mall Parkway to Cushing Boulevard and on only the west side of the road from Cushing Parkway to Landing Parkway. Class II lanes also exist on both sides of the road from Warren Avenue to Dixon Landing Road. A Class II route exists from Landing Parkway to Warren Avenue. A Class I bike path was recently constructed on the west side from Dixon Landing Road to the levee to the north.

Auto Mall Parkway

Class II bike lanes exist on both sides of the road from Osgood Road (Warm Springs Boulevard) to the I-880 ramps.

Cushing Parkway

Class II bike lanes exist on both sides of the road from Fremont Boulevard to Bunche Drive.

Grimmer Boulevard

Class II bike lanes exist on both sides of the road from I-680 ramps to Auto Mall Parkway.

Kato Road

A Class II bike lane exists on the west side of the road on a short segment south of the Tesla Motors factory. Class II bike lanes also exist on both sides of the road from Benicia Street to A Street, on the west side of the road only from A Street to Page Avenue, and on both sides of the road from Milmont Drive to Warm Springs Boulevard. A Class III route exists from Page Avenue to Milmont Drive.

Mission Boulevard

Class II bike lanes exist on both sides of the road from Warm Springs Boulevard to the I-680 ramps.

Levee Bike Path

A Class I bike path extends north-south parallel to, and west of, Fremont Boulevard from Warren Avenue to Lakeview Drive (levee).



Appendix B

Future Roadway, Bicycle and Pedestrian Infrastructure Improvements in South Fremont

Fremont Boulevard – Warren Avenue to Cushing Road

Medians will be constructed and will turn into business driveways. These improvements are nearly complete. Sidewalk will be constructed along the west side of Fremont Boulevard, just north of Warren Avenue. Class II bike lanes will be constructed along both sides of Fremont Boulevard.

Grimmer Boulevard – Osgood Road to Parkmeadow Drive

An additional eastbound and westbound through lane will be constructed on the east leg at Osgood Road. New bike lanes, sidewalks, and curb ramps will be constructed along the south side of road from Osgood Road to I-680.

Kato Road – Warren Avenue to Milmont Drive

Concrete sidewalks and curb ramps will be constructed on the south side of road from Warren Avenue to Milmont Drive. The west leg of Kato Road / Benicia Street intersection will be restriped to one eastbound shared through-right, one eastbound left-turn, and two westbound through receiving lanes. A two-way-left-turn lane will also be installed west of Benicia Street.

Auto Mall Parkway – Fremont Boulevard to Osgood Road

Bike lane striping will be installed on east and west legs at Fremont Boulevard intersection. Concrete sidewalk will be constructed on the south side of road from Fremont Boulevard to Hugo Terrace.

Fremont Boulevard – Grimmer Boulevard to Industrial Drive

A new traffic signal will be installed at Fremont Boulevard / Ingot Road intersection. New medians and dual left-turn lanes will be constructed at Fremont Boulevard / Grimmer Boulevard intersection on eastbound, westbound, and south bound approaches. Additional southbound and eastbound through lanes on approaches will be constructed as well as a southbound bike lane on the north leg.

Future Innovation Way – Fremont Boulevard to BART Station

Future Innovation Way will be a two-lane undivided roadway constructed from Fremont Boulevard to Lopes Road. Concrete sidewalks and Class II bike lanes will be constructed on both sides of the new road, including on-street parking. Fremont Boulevard / Ingot Road/Innovation Way intersection approaches will be improved to include one eastbound left-turn and one shared through-right; one northbound left-turn, two throughs, and one shared through-right; one westbound left and one shared through-right; and one southbound left-turn, two throughs, and one shared through-right. Newly constructed Innovation Way / Lopes Road intersection will be a three-legged intersection with one eastbound left-turn and one right-turn; one northbound shared through-left; and one southbound shared through-right.

Lopes Court – Grimmer Boulevard to Innovation Way

A two-lane undivided roadway will be constructed from Grimmer Boulevard to Innovation Way. New bicycle lane striping, parking lane striping, and concrete sidewalks will be installed on both sides of the road.



Kato Road (Tesla and Thermo Fisher Frontage Road) – Innovation Way to Mission Boulevard

The future condition of Kato Road is anticipated to change. Currently, the City is working with property owners on a redesign of the roadway configuration that would provide efficient and adequate access to and from businesses and improve conditions for vehicles, bicyclists and pedestrians.

UPRR Rail Trail – Clarke Drive to Milpitas City Limits

If adequate right-of-way can be sufficiently provided, a pedestrian and bicycle trail could be constructed parallel to the UPRR alignment and will extend from Clarke Drive to the Milpitas City Limits.

Grimmer Boulevard – Lopes Court to Osgood Road

A new concrete sidewalk will be installed on the south side of road from Lopes Court to Osgood Road.

Bicycle/Pedestrian Bridge – Fremont Boulevard to Kato Road

A bicycle and pedestrian bridge is anticipated to be constructed from Fremont Boulevard to Kato Road. This bridge will extend over I-880.

Pedestrian Bridge – Lopes Court to WS/SF BART Station

A pedestrian bridge and plaza is currently under the final stages of design and will connect new developments on the west side of the rail alignment to the new WS/SF BART Station. Construction should start in 2017 and the anticipated opening of the bridge and plaza will be early 2019.



Appendix C

Survey Form

Welcome to the City of Fremont Shuttle Survey

This anonymous, short survey will take less than 5 minutes to complete.

The City of Fremont is studying the feasibility of providing a shuttle service to and from the new Warm Springs BART Station for employers located in the vicinity of the study area. Completing this survey will assist us in refining a proposed shuttle service and will make your commute much more enjoyable.

Thank you for participating in this survey. Your feedback is important to us!

Place of Residence

* 1. What is the zipcode for your place of residence? (Enter numbers)

Trip from Home to Work

* 2. Approximately what time do you most frequently arrive at work?

Trip from Home to Work

* 3. How many days per week do you arrive at work prior to 5 AM or after 11 AM?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- Never

Trip from Home to Work

* 4. Approximately how long does it take for you to travel from home to work on a typical morning?

- 0-15 minutes
- 15-30 minutes
- 30-45 minutes
- 45-60 minutes
- 60-75 minutes
- 75-90 minutes
- 90-105 minutes
- 105-120 minutes
- More than 120 minutes

Trip from Home to Work

* 5. How often do you make stops during your commute from home to work? (e.g. Coffee, Breakfast, Gym, School or Day Care, etc.)

- Never
- Occasionally
- Frequently
- Daily

Trip from Home to Work

* 6. What stops do you make? (Select all that apply)

- Coffee or Breakfast
- Gym
- School or Day Care Drop-Off
- Other

Trip from Home to Work

* 7. How many times per week does traffic congestion or delays cause your average commute time from home to work to increase by more than 15 minutes?

- 0
- 1
- 2
- 3
- 4
- 5

Trip from Home to Work

* 8. What is your primary mode of travel from home to work? (Select the travel mode used for your typical journey to work)

- Drive Alone
- Carpool or Vanpool
- Bike
- Walk
- Company Shuttle
- App-Based Transportation / Taxi
- Bus
- Rail (BART or Train)

Trip from Home to Work

* 9. How many days per week on average do you use the primary mode previously identified to travel from home to work?

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Trip from Home to Work

* 10. What other mode(s) do you use to travel from home to work? (Select the travel mode(s) used for your typical journey to work)

- I only use the one primary mode to travel from home to work
- Drive Alone
- Carpool or Vanpool
- Bike
- Walk
- Company Shuttle
- App-Based Transportation / Taxi
- Bus
- Rail (BART or Train)

Trip from Home to Work

* 11. If buses are one of your modes of travel from home to work, which bus or buses do you ride? (Select all that apply)

- Buses are not one of my modes of travel from home to work
- Santa Clara VTA
- AC Transit
- Other

Trip from Home to Work

* 12. If trains are one of your modes of travel from home to work, which train(s) do you ride? (Select all that apply)

- Trains are not one of my modes of travel from home to work
- BART
- ACE
- Capitol Corridor
- Caltrain

Trip from Home to Work

* 13. Do you, at least once per week, use an alternative mode of transportation to travel from home to work?

Yes

No

Trip from Home to Work

* 14. How many days per week on average do you use an alternative mode to travel from home to work?

Once per week

Twice per week

More than twice per week

Trip from Home to Work

* 15. Select all alternative mode(s) you use to travel from home to work.

Drive Alone

Carpool or Vanpool

Bike

Walk

Company Shuttle

App-Based Transportation / Taxi

Bus

Rail (BART or Train)

Trip from Home to Work

* 16. If buses are one of your alternative modes of travel from home to work, which bus or buses do you ride? (Select all that apply)

- Buses are not one of my alternative modes of travel from home to work
- Santa Clara VTA
- AC Transit
- Other

Trip from Home to Work

* 17. If trains are one of your alternative modes of travel from home to work, which train(s) do you ride? (Select all that apply)

- Trains are not one of my alternative modes of travel from home to work
- BART
- ACE
- Capitol Corridor
- Caltrain

Trip from Work to Home

* 18. Approximately what time do you most frequently leave work in the afternoon/evening?

Trip from Work to Home

* 19. How many days per week do you leave work prior to 2 PM or after 8 PM?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- Never

Trip from Work to Home

* 20. Approximately how long does it take for you to travel from work to home on a typical afternoon/evening?

- 0-15 minutes
- 15-30 minutes
- 30-45 minutes
- 45-60 minutes
- 60-75 minutes
- 75-90 minutes
- 90-105 minutes
- 105-120 minutes
- More than 120 minutes

Trip from Work to Home

* 21. How many times per week does traffic congestion or delays cause your average commute time from work to home to increase by more than 15 minutes?

- 0
- 1
- 2
- 3
- 4
- 5

Trip from Work to Home

* 22. Do you use the same mode(s) to travel from home to work as you use to travel from work to home?

- Yes
- No

Trip from Work to Home

* 23. What is your primary mode of travel from work to home? (Select the travel mode used for your typical journey to home)

- Drive Alone
- Carpool or Vanpool
- Bike
- Walk
- Company Shuttle
- App-Based Transportation / Taxi
- Bus
- Rail (BART or Train)

Trip from Work to Home

* 24. How many days per week on average do you use the primary mode previously identified to travel from work to home?

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Trip from Work to Home

* 25. What other modes do you use to travel from work to home? (Select the travel mode used for your typical journey to home)

- I only use the one primary mode to travel from work to home
- Drive Alone
- Carpool or Vanpool
- Bike
- Walk
- Company Shuttle
- App-Based Transportation / Taxi
- Bus
- Rail (BART or Train)

Trip from Work to Home

* 26. If buses are one of your modes of travel from work to home, which bus or buses do you ride? (Select all that apply)

- Buses are not one of my modes of travel from work to home
- Santa Clara VTA
- AC Transit
- Other

Trip from Work to Home

* 27. If trains are one of your modes of travel from work to home, which train(s) do you ride? (Select all that apply)

- Trains are not one of my modes of travel from work to home
- BART
- ACE
- Capitol Corridor
- Caltrain

Trip from Work to Home

* 28. Do you, at least once per week, use an alternative mode of transportation to travel from work to home?

- Yes
- No

Trip from Work to Home

* 29. How many days per week on average do you use an alternative mode to travel from work to home?

- Once per week
- Twice per week
- More than twice per week

Trip from Work to Home

* 30. Select alternative mode(s) you use to travel from work to home. (Select all that apply)

- Drive Alone
- Carpool or Vanpool
- Bike
- Walk
- Company Shuttle
- App-Based Transportation/Taxi
- Bus
- Rail (BART or Train)

Trip from Work to Home

* 31. If buses are one of your alternative modes of travel from work to home, which bus or buses do you ride? (Select all that apply)

- Buses are not one of my alternative modes of travel from work to home
- Santa Clara VTA
- AC Transit
- Other

Trip from Work to Home

* 32. If trains are one of your alternative modes of travel from work to home, which train(s) do you ride? (Select all that apply)

- Trains are not one of my alternative modes of travel from work to home
- BART
- ACE
- Capitol Corridor
- Caltrain

Car Use During Day

* 33. How often do you need a car during your work day?

- Always
- Often
- Sometimes
- Occasionally
- Never

Car Use During Day

* 34. During an average work week, how many days do you use your car during work hours (between the time you arrive at work and leave from work)?

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Car Use During Day

* 35. I use my car during a typical work day for _____. (Select all that apply)

- Meetings
- Lunch
- Errands
- Other

Warm Springs BART Station

* 36. The Warm Springs BART station will open in just a few months. Do you plan to use BART for your commute?

- Yes
- No
- Not Sure

Warm Springs BART Station

* 37. Why would BART not be an option for your commute? (Select all that apply)

- I don't live near a BART station
- I need my car to make stops during my commute or during the day
- BART is too expensive
- BART doesn't operate when I need to get to/from work
- BART is not as convenient for me as other modes
- I prefer to drive
- Other reasons

Warm Springs BART Station

* 38. Why do you plan on taking BART to work once the station opens? (Select all that apply)

- BART will be faster than other options
- BART will be cheaper than other options
- BART will be more reliable than other options
- I prefer not to drive
- Other Reasons

Warm Springs BART Station

* 39. What questions do you have that would help you decide whether to take BART? (Select all that apply)

- Would BART be faster than my current mode?
- Would BART be cheaper than my current mode?
- Would BART be more reliable than my current mode?
- Does BART operate when I need to get to/from work?
- Will I be able to get to/from the BART stations?
- I don't regularly use BART and need to learn more about it.
- Other

Warm Springs BART Station

* 40. I would take BART if it was less expensive or if I received a discounted price.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree
- Don't Know
- I already take BART

Warm Springs BART Station

* 41. If you could take a FREE shuttle between the new BART station and your office, would you use the shuttle?

- Yes
- No
- Not Sure

Warm Springs BART Station

* 42. I would be interested in being able to bike between the new BART station and work.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree
- Don't Know

Warm Springs BART Station

* 43. I would be interested in using a free shuttle to/from the BART Station or nearby lunch/shopping locations during the day.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree
- Don't Know

Warm Springs BART Station

* 44. I would be interested in learning more about ridesharing or carpooling options.

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree
- Don't Know



Fremont Innovation District
LAST MILE TRANSIT
Program Feasibility Study
and Conceptual Design

Appendix D

Open House Invitation

BART Station Last Mile Shuttles Open House Invitation!

Warm Springs BART Station 'Last Mile' Transit Connection Study

When: *Drop-in format on* Thursday, January 21st, anytime between 12 PM and 7 PM, with 5 minute presentations at 12 PM, 3 PM and 6 PM

Where: GenZe corporate headquarters - 2901 Bayview Drive, Fremont, CA 94538

The new Warm Springs/South Fremont BART Station opens this year and will add an important commute option for YOUR employees working in Fremont's Innovation District.

The City of Fremont has commissioned a study to examine the feasibility of a 'last mile' shuttle program and other possible transit modes for connecting employees in the area to BART.

Employers, employees, and the general public are invited to attend a drop-in "Open House" to learn more about this study and to provide feedback on preliminary findings, including potential shuttle routes.

Drop in anytime between 12 PM and 7 PM for the following:

- informational presentations at 12 PM, 3 PM, and 6 PM
- open discussions with transportation planning experts
- visual aids and information showing the Innovation District boundaries, the BART station area, and future development plans
- overview of potential shuttle routes and employee survey response data collected to date

No RSVP required. For questions, please contact Kim Marshall at (510) 284-4026 or kmarshall@fremont.gov



Appendix E

Framework for Operations of Last Mile Service

Concept of Operations

The service is intended to be “door-to-door” with most stops (except at the WS/SF BART Station) as near as possible to main building entrance participating businesses. A small sign (1 foot x 1 foot) will be posted on a pole where the shuttle will load and unload passengers. Specific routing and stops will be determined for each route based on employer participation and/or changes to commute patterns and roadways. Participants will be provided with approximate stops and the most advantageous routing possible within given resources. As participation grows, additional stops will be added to each route, and routing will be adjusted as needed. At WS/SF BART, last mile shuttles will stop at a yet-to-be-designated location in the bus transit area of the station.

In order to minimize travel time in each direction, shuttle stops should be located on the main streets whenever possible. There may be some instances where the stop will need to be inside private property (for example, as in the case might be for larger campuses like Tesla Motors), as the building entry is too far from the street-side.

There are several ways to designate a bus stop. One low cost option, at least for during the start-up period, will be to use weather-resistant sidewalk or pavement decals to mark the location of the shuttle stop. Budget permitting, more traditional bus poles and signage may be installed, or another, more unique ‘branding’ such as flags that also create a sense of place within the Innovation District.

Near Term Technology Applications

Last mile service offers a number of opportunities for the application of advanced user or operator oriented technologies. Several will be considered essential to incorporate upon start-up of a service. Some are not necessary for an initial service but ought to be evaluated for adoption after a reasonable operating period when service performance is established. And still others are probably premature and not realistically an option for several years and until proven elsewhere.

The technology most important for a start-up service is a proven, reliable, and user friendly, GPS based passenger information system. Shuttle buses should be trackable relative to their locations along their routes and estimated arrival/ departure times at particular stops. This information should be readily available to users. In the transit world this is typically done by installing a CAD-AVL (computer aided dispatch/automatic vehicle location using GPS technology) system on transit vehicles and processing/transmitting information on vehicle location to information signs or Smartphone and web-based platforms using NextBus or similar technology. These systems are essential in predicting bus arrival information at stops.

A representative passenger information system that is proven and should be considered is NextBus. NextBus is a dynamic and predictive arrival information platform that is updated at regular intervals based on real-time data to best account for variations in traffic, shuttle vehicle breakdowns, and day-to-day problems. It is one of several such passenger information systems. Using the NextBus platform, riders can get transit information in a variety of different way and through a variety of different mediums including the smartphones, computers, tablets, and LED signs. Users can also text to receive arrival information and subscribe to receive messages pertinent to their routes. Currently, both Emery-Go-Round and San Francisco Mission Bay Transportation Management Association, University of California, San Francisco Medical Center, Oakland Kaiser Permanente Medical Center, and Alameda County Medical Center shuttle services employ NextBus. Bay



Area public transit operator AC Transit uses it as well as the Dumbarton Express bus service between the East Bay and San Mateo/San Francisco Peninsula.

NextBus uses GPS technology and historical travel data to track transit vehicles and predict their arrival time. By taking into account the actual position of vehicles, their intended stops, and typical traffic patterns, NextBus can estimate vehicle arrivals with a high degree of accuracy. This estimate is refreshed constantly to provide riders with up-to-the-minute information. This type of information will be key to attracting riders to a last mile service in south Fremont.

Such a system, or variant of it, could be applied to the Innovation District last mile service. Real time personalized information gives riders confidence that the shuttle is dependable and will greatly influence perceptions about reliability, wait times, and the overall attractiveness of the service offered. Providing message signs at most stops (besides the Warm Springs BART shuttle stop itself), other communications equipment, and user amenities are not necessary upon start-up in order to keep the technology costs of a last mile service reasonable. Smartphone and web-based information applications will serve customers well and will keep operation costs relatively low.

Any solicitation for a last mile service provider should include as a contract requirement that a real time (map-based) vehicle tracking and passenger information system be an integral part of any operation. The system should have the capability to provide, if desired by shuttle users, automatic real-time notifications when service is disrupted or a desired trip is running late, etc.

Shuttle Bus/Transit Priority

Other technology options to consider for the near term will include shuttle priority treatments along the local area roadway system. Last mile shuttles will be given priority through intersections under certain conditions, similar to how conventional transit buses and light rail vehicles now commonly receive priority in major corridors, referred to as transit signal priority (TSP). There may also be opportunities to offer last mile shuttles queue jump priority at intersections. All of these treatments require evaluation. Does the existing technology support TSP? Is it, and similarly are queue jumps, warranted relative to the impacts they may cause to other traffic? These types of treatments should be studied in the next phase of start-up planning. Improving shuttle operations through intersections and along certain roadway segments will likely improve the reliability, and thus attraction, of a last mile service.

Long Term Technology Applications

As the service matures, more features can be evaluated and incorporated into a last mile program. Keep in mind is that private app developers are very creative and if given the opportunity, can advance technology based information systems quickly and at little to sometimes almost no expense. Some transit agencies have recognized this and encouraged private developers to create user information systems rather than attempt to create them in-house. Thus, there is a benefit to not having the selected last mile service provider lock the City in to using proprietary, closed-architecture systems.

As data is gathered on last mile user preferences, travel patterns and shuttle service utilization in general, modifications to the initially proposed fixed-route, fixed-schedule service model may be warranted and generate better utilization and/or lower operating costs. For example, perhaps ridership during certain periods of the day is light or highly variable in its patterns (e.g. some employers and activity centers generate more trips than others at certain hours). At these times more dynamic routing and trip frequencies may be warranted. Perhaps service to certain locations should be on-call rather than regularly scheduled (think of during the evening or on weekends should it be proposed to extend service to beyond the weekday, or simply light travel hours during the weekday midday). Similar to FLEX type transit services described elsewhere in this report and somewhat akin to shared-ride services, users will call for shuttle service in advance. They will receive confirmation of



a service pick-up (and drop off at the desired location) and the times. Technology is already available to do this (the user interfaces being the Smartphone and service website, among others). It will only improve with time.

Connected vehicle technology is emerging and should also be considered for last mile service as it evolves. Shuttles should be able to communicate with each other automatically and provide information to shuttle drivers. While providing drivers real time information on other shuttle operations is nothing new, there is other information that can be provided by having vehicles communicate with each other and with other infrastructure; this has the potential to improve shuttle service performance and effectiveness in capturing users. By communicating with traffic signal controllers, shuttle vehicles (and the vehicle driver) will know when a signal is turning green or red or maybe is not operational. A green phase may be actuated when a signal is otherwise operating on a fixed-time regime (e.g. early AM or later PM) and will cause travel delays. Shuttle drivers could receive real time information on roadway conditions, including whether a segment is blocked or very congested. Drivers will also be informed if BART is on-time or not (this information is, of course, already available through various transit monitoring applications; the thought here is that the shuttle vehicle is automatically receiving this type of information and processing the information for easy access by the driver).

While connected vehicles can “talk” to one another and to traffic signals and other systems, autonomous signals can operate driverless (the expectation is they are also connected vehicles). Although there is much buzz that autonomous vehicles (public and private) are almost here or at most a couple of years away for general operation, this is probably quite optimistic. They could, however, be relatively close for specific applications. In a controlled environment, such vehicles are likely to be seen in the near term. Examples of controlled environments include business/research campuses; dedicated lanes that connect activity centers; parking lots and garages; and other controlled operating environments. It is difficult to see such vehicles operating soon in general purpose lanes in busy urban areas or even on major arterials, highways, and freeways in other areas. There are institutional obstacles, not only additional technological challenges, to overcome.

Nevertheless, one can envision autonomous vehicles operating on a last mile service at some point. First, however, will be the connected vehicle applications, which should be implemented on a last mile service as the technology is proven and its cost becomes reasonable.



Appendix F

Transportation Management Association Implementation Program and Best Practices

Step 1

A program steering committee (an “interim TMA”) should be established, consisting of a representative group of supporters/employers, to build up a core membership, develop a mission statement, assess and refine most pressing transportation needs, and identify initial funding mechanisms. The interim TMA should include major employers interested in a last mile transit program that could later form the legal entity of the TMA and become its first members.

Once formally established as an organization, the TMA would be operated by an executive director and a staff of transportation coordinators at the direction of an elected board of directors (or interim board if the legal and organizational structure of the TMA has not been established). The board of directors provides the highest level of decision making and direction to the TMA staff, including creating the legal and organizational structure at startup, setting membership dues, establishing transportation service agreements, approving budgets and making decisions for its members. The board of directors should be comprised of stakeholders, such as major tenants and employers, property owners, and future homeowner’s associations to guide program startup and then advise on near- and long-term operations, ensuring that the membership is using services to their fullest extent.

An executive director should be recruited to lead development of the transit program. Consultants specializing in TMAs can be retained to assist with a work plan that is coordinated with the City. It is anticipated that the City would initially help to spearhead formation of an interim TMA until participants have signed up and formal organization is established. In addition, other agencies, like VTA, ACTC, ACE and BART could also participate on the steering committee or interim TMA to provide assistance. The eventual TMA will plan, fund, manage and operate the transit program provided to its members.

Step 2

Once the interim TMA is in place and commitments of participation are obtained, the interim TMA should develop the following strategic elements for a last mile program. It is anticipated that the interim TMA could initially be the management body for the last mile shuttle service if an executive director has not yet been identified.

1. Outline the subsequent steps in program development, including additional technical studies required and recruiting of TMA staff to administer program details.
2. Develop vision, goals and policy statements for the transit program implementation and operation.
3. Refine operating and maintenance costs for the initial last mile service.
4. Finalize the transit service plan, including near- and long-term implementation programs. For shuttle services, the following components must be identified:
 - Shuttle route(s) and stops (see Appendix E for more information on service characteristics)
 - Hours of operation; and
 - Shuttle schedules.



5. Identify and start the procurement process for transit services (e.g., preferred shuttle vehicles and the operating approach, such as a privately-contracted service to be selected through a competitive process).
6. Identify technologies to be provided (e.g., rider information, web and smart phone applications, etc.) and which should be included in any RFP for a service provider.
7. Identify and develop strategies to incentivize use of the transit program and/or disincentivize solo driving.
8. Provide educational, marketing, and branding materials for the transit program, including developing a web site and other useful resources. System signage/art work on shuttles and at employer stops should also be proposed.
9. Monitor and report progress towards meeting trip reduction goals and identify problems requiring adjustments to the transit program.

Step 3

The funding program for a last mile service should be determined and solidified before proceeding far with the strategic implementation elements included in Step 2. It may influence the type of management organization for a service, operating approach for service provision, and level and types of service that can be provided initially and potentially in the near- and long-term.

Step 4

With more detailed information on last mile service characteristics, a timeline for implementation, and funding program, the interim TMA would lead the effort to reach out to all pending program participants and ensure their commitment to becoming members of the formal TMA. Some adjustments in the proposed program may be warranted based on feedback from the larger pool of participants. The interim TMA would also disseminate information to other businesses and activity centers in the Innovation District not previously expressing interest in the program to determine if they, too, would now like to be members. When a last mile service passes the threshold of feasibility and is about to become reality, more businesses may decide to join the membership rather than be left out of the program.

Marketing and community engagement are important for the success of a last mile service. In order to have the most robust service from the start, it's important to try to get as much participation and financial support as possible. It will be up to the interim TMA to solicit support, participation and commitment to pledging membership from employers and property owners in the geographic areas identified for service in the initial stage.

Equally important will be providing educational materials, marketing the service and getting information out to the areas slated for start-up service. This may include special events, one-on-one meetings with employers and employees, development of a website, schedules and marketing communications. As the service launch approaches, project sponsors may also want to give 'demonstration' rides to make sure riders know what the vehicles look like, where they'll be picked up and other details that make them feel comfortable trying a new service.



Step 5

Once service levels, budgets, and funding formulas have been finalized and agreed upon, the interim TMA should evaluate organizational options and inform the City of their choice. Three options appear feasible, including:

- Forming a new organization (501 c3 or 4) expressly for shuttle and other TDM programs under consideration for implementation in the Innovation District.
- Contracting with an entity such as the Chamber of Commerce, a business group, or an association (e.g., Bayside Property Association). For example, the TransManage TDM program in Bellevue, WA, is under the Bellevue Business Association. The Fremont Chamber is an existing organization that could potentially help implement and administer the service, leveraging its ongoing relationships with many program participants or potential participants that would become members of the TMA.
- Contracting with a public entity (City or AC Transit) to be fiscal and operational lead (at least during start-up). The benefit is the public entity has complete, direct control over the service. It may be quicker and easier to effect program changes that the public entity finds desirable early in the program than if having to direct those changes be made by a separate entity.

Forming the official TMA entity is expected to take between 12 -18 months. Depending on the type of organizational structure chosen, legal documents such as bylaws, articles of incorporation, and potentially City (or other existing entity) contracts and transportation service agreements can be drawn up by the interim TMA. Simultaneously, request for proposals (RFPs) can be released for transit services providers. Once a legal and organizational structure has been established, the TMA can begin its operational stage, which includes administration and service delivery.

Best Practices When Implementing a Last Mile Service

A number of challenges remain as a TMA proceeds with implementation studies for a last mile service. Further challenges will be faced when once service is underway. Several lessons learned from the implementation and operations of other similar shuttle systems are offered. These best practices include:

- Develop a business case for employers so that they realize the benefits of the shuttle service. This is fundamental to obtaining their support for a start-up service and ongoing participation as the service matures and potentially expands.
- Stay flexible to meet customer needs. This means keeping in touch with employers and their employees who constitute the user market. Surveys of users and providing opportunities for users to offer comment/complaint at any time are important. Smart phone and internet/social media technology offer convenient means for keeping in contact with users.
- Adjust to changes in the employment environment. The Innovation District will continue to grow, creating more last mile service opportunities.
- Adjust to revisions in schedules. This is basic. The TMA must be cognizant of changes in BART and AC Transit schedules, traffic conditions that affect shuttle travel times, and other characteristics of the transportation environment.
- Stay flexible if traffic conditions change. Shuttles should have alternate routing options if conditions change suddenly. If the changes appear to be more permanent, possibly shuttle routing will need to be modified.
- Operational and maintenance funding must accommodate flexibility. Operating reserves to cover unexpected events are advised.
- Coordinate with primary or supplemental support services and communicate with other agencies. Especially in the Innovation District this means tracking the changes in service that are being implemented by AC Transit and VTA. Also, coordinate with other existing and proposed private and public transit services in the area.

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