

Beyond Traffic: Smart City Challenge





ACKNOWLEDGEMENTS

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Cover Design: The City of Fremont hires local artists to paint murals on traffic signal cabinets with images reflecting the local community, including themes related to sustainability. The cover design was adapted from photographs of a “box art” mural, painted by local artist Suzanne Gayle (Star Arts Studio), and located in Downtown Fremont, at the intersection of BART Way and Civic Center Drive.



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THE FREMONT ADVANTAGE

REAL CHALLENGES, INNOVATIVE OPPORTUNITIES, AMAZING RESULTS,
REPRODUCIBLE EVERYWHERE

The City of Fremont enthusiastically welcomes the opportunity to participate in the “Beyond Traffic: Smart City Challenge” sponsored by the U. S. Department of Transportation (USDOT). Fremont is the perfect location for demonstrating how real transportation issues can be effectively addressed through the innovative integration of existing infrastructure with emerging transportation technologies, data and applications.

This proposal developed by Fremont, in collaboration with a team of innovative and experienced partners, provides a showcase for how a mid-sized US city can implement an amazing transportation system with positive measureable outcomes that reduce congestion, keep travelers safe, protect the environment, respond to climate change, connect underserved communities and support economic vitality.

USDOT has provided thoughtful guidance on the goals of a Smart City transportation system along with twelve vision elements, with highest priority given to urban automation, connected vehicles and sensor based infrastructure. Fremont is pleased to present a proposal that comprehensively addresses all of the USDOT goals, vision elements and priorities.

Most importantly, and as described below, the Fremont proposal takes on **real challenges** facing the local community, has identified a team of resources able to deliver on **innovative opportunities** with **amazing results**, and in a context that is **reproducible everywhere**.

FACING REAL CHALLENGES

Safety – In 2015, traffic fatalities in Fremont were 60 percent higher than the average from the past decade (eight fatalities in 2015 as compared to an average of five over the past decade). Fremont’s historic main street Fremont Boulevard was the location of half the fatalities, which included three pedestrians and one bicyclist. One fatality involved a 78-year old pedestrian struck by a shuttle bus. A Fremont Smart City Challenge project proposes to demonstrate how multimodal street design, combined with intelligent, sensor-based infrastructure can improve transportation safety for all users, all ages and all abilities. Other projects support acceleration of automated and connected vehicle technologies that hold the promise to essentially eliminate crashes between vehicles and people.

Congestion – Rapid job growth in the Bay Area has created traffic congestion conditions in Fremont that are among the worst in the nation. The 2015 Urban Mobility Scorecard prepared by INRIX and the Texas Transportation Institute identified the San Francisco Bay Area as the third worst “gridlock-plagued” area, closely following Washington DC and Los Angeles. A Smart City Challenge project provides on-demand information and mobility options designed to increase the use of alternative travel modes and help manage congestion. Other projects use emerging technologies to create new models of effectiveness for transit, bicycling and ridesharing services.



Environment and Climate Change – In Fremont, motor vehicles are the source of 58 percent of greenhouse gas emissions. Accelerating the development of electric vehicles and supportive infrastructure can have a significant benefit to the environment. Two Smart City Challenge projects support electric vehicle systems.

Social Equity – Fremont is a community that warmly embraces diversity and people with special needs. Ethnic populations include large communities with origins from India, China, Mexico, the Philippines and Afghanistan; nationally renowned schools for the blind and deaf call Fremont home; and Fremont operates the Family Resource Center, a one-stop shop for 25 different social services supporting seniors, veterans, persons with disabilities and people with needs for housing, employment and child care. A goal of several Smart City Challenge projects is to design modern mobility systems that serve people from all ages, abilities and cultures, using Fremont's unique diversity and existing support services to efficiently and equitably reach communities with special needs.

DELIVERING ON INNOVATIVE OPPORTUNITIES WITH AMAZING RESULTS

Fremont is part of the Silicon Valley and Bay Area ecosystem that is a global leader for innovation. Modern advances in mobility are now being innovated in the Fremont area, with the world's most advanced electric vehicles being made by Tesla Motors in their Fremont factory. Nearby, other companies like Google and Lyft are helping to invent the future of mobility. Almost all the global automobile companies, including Ford, Toyota and BMW have research and development centers in the Silicon Valley. Among all the mid-sized cities eligible to participate in the Smart City Challenge, Fremont has the closest proximity to innovation talent that can now deliver an amazing modern transportation system. Our proposal includes an initial list of over twenty interested partners, many of which have provided letters of support.

REPRODUCIBLE EVERYWHERE

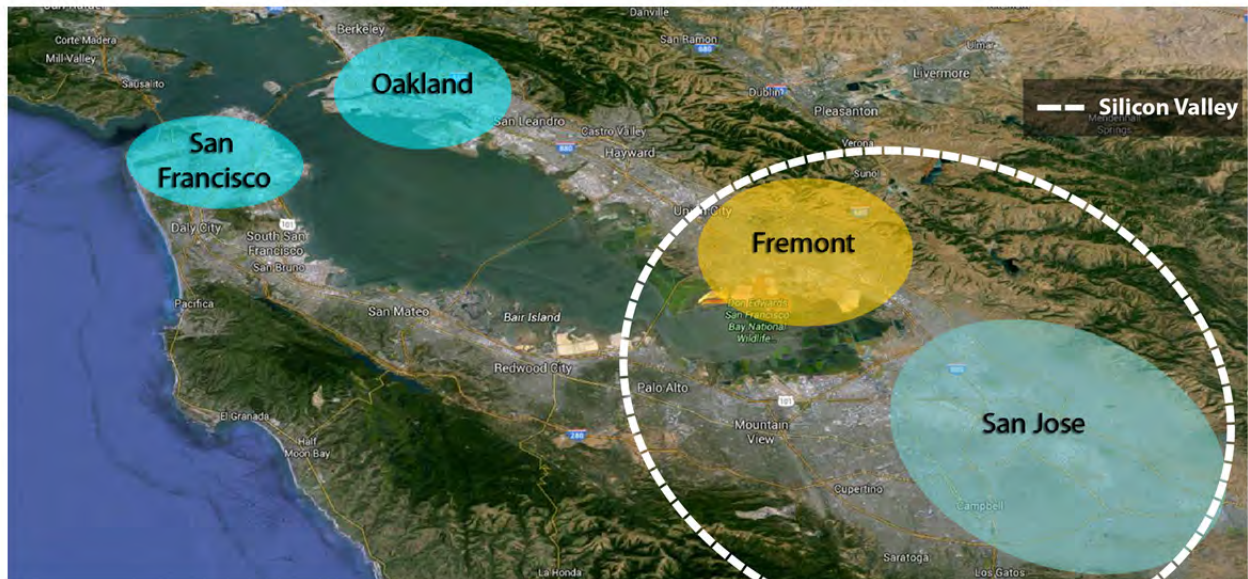
Another significant Fremont advantage is its land use and transportation characteristics that are very representative of how the majority of Americans live. Fremont is a mostly suburban community, within a major metropolitan area – the 4th largest city among the 101 cities in the San Francisco Bay Area. Growing from a collection of small towns, much of the Fremont's land area was developed from 1960 to 1990 in a sprawling, auto-oriented pattern. A key mobility challenge for the US is how to transform suburban places to be more sustainable. Fremont is already serving as a national model for suburban transformation.

With Fremont's small town roots, its suburban history, and with a bold vision of being a model city for strategic urbanism ... if you can make it here, you can reproduce it everywhere!



ABOUT FREMONT

LOCATION AND POPULATION



Fremont, California is a mid-sized city of regional significance within the San Francisco Bay Area. With a population over 7 million people, the Bay Area is among the largest metropolitan areas in the United States. Typically, the Bay Area is defined as the nine counties and 101 cities closest to the San Francisco Bay.

Fremont is the fourth largest city in the Bay Area in terms of population and the second largest in land area (see Table 1). Fremont is centrally located between the Bay Area's two largest cities -- San Jose, the nation's tenth-largest city with a population of over one million people is just to the south, and San Francisco, the second-densest city in the U.S. after New York City, is to the northwest. Located in Alameda County, Fremont is the county's second largest city after Oakland.

Table 1: Four Largest Cities in the San Francisco Bay Area

CITY	INCORPORATED	POPULATION (2014)	POPULATION (2010)	AREA (SQ. MI.)
San Jose	1850	1,015,785	945,942	177
San Francisco	1850	852,469	805,235	47
Oakland	1852	413,775	390,725	56
Fremont	1956	228,758	214,089	77

The population of Fremont listed in the 2010 Census was 214,089, representing about six and a half percent of the San Francisco-Oakland Census Urbanized Area (CZA). According to the Census Bureau, Fremont had a density of about 2,764 persons per square mile in 2010. While Fremont is associated by the Census geography with the San Francisco–Oakland CZA, in



economic and social terms the city is very much part of the global hub of innovation known as Silicon Valley¹.

While the Silicon Valley does not have distinct geographic boundaries, the core area includes most of Santa Clara County and the southern areas of San Mateo and Alameda Counties. Table 2: includes a list of the nine contiguous core cities of Silicon Valley and their major technology companies². **Fremont is the only Silicon Valley city eligible to participate in the Smart City Challenge**, as San Jose is too big (over 850,000) and Sunnyvale is too small (under 200,000).

Table 2: Silicon Valley's Top Nine Core Cities

CITY	POPULATION (2010)	MAJOR TECHNOLOGY COMPANIES
San Jose	945,942	Cisco Systems, eBay, Adobe, SunPower
Fremont	214,089	Tesla Motors, Synnex, Lam Research
Sunnyvale	140,081	Yahoo, NetApp, Advanced Micro Devices
Santa Clara	116,468	Intel, Applied Materials, Agilent
Mountain View	74,066	Google, Intuit, LinkedIn
Milpitas	66,790	SanDisk
Palo Alto	64,403	Hewlett Packard
Cupertino	58,302	Apple
Menlo Park	32,026	Facebook

Fremont's current population is approximately 229,000 and rising. According to the city's current General Plan, the population is projected to increase to about 256,000 by 2035. Much of the projected growth will be accommodated in developments having a dense urban form and concentrated around the city's regional transit stations.

DEVELOPMENT HISTORY AND A SMART GROWTH VISION

Fremont was originally planned and developed when the automobile was the dominant form of transportation, fossil fuels were inexpensive, roads were less congested, and climate change was not a concern. As a result, the city's infrastructure is automobile-oriented with wide streets and expansive parking areas and the city's housing-development pattern is mostly suburban in character.

"Fremont will serve as a national model of how an auto-oriented suburb can evolve into a sustainable, strategically urban, modern city."

Fremont General Plan Vision Statement

Historically, Fremont was an agricultural community. When the city incorporated in 1956, five established small towns -- Centerville, Irvington, Mission San Jose, Niles and Warm Springs fell within its boundaries. During the subsequent 50 years, the five original town centers have been

¹ If combined with the San Jose, CA Urbanized Area, Fremont would represent about eleven percent of the total.

² San Francisco has recently become a location for technology companies such as Twitter, Uber and Lyft.



linked by suburban development. At the time of Fremont's golden anniversary in 2006, City leaders and community members embarked on an update to the City's General Plan and marked a turning point for Fremont's vision for the future. In 2011 a new General Plan was adopted with a bold vision supporting smart growth.

Today, Fremont is implementing "strategically urban" smart growth development consistent with the General Plan and oriented around Fremont's four regional transit stations in the Downtown/City Center area (existing BART rapid transit station), South Fremont/Warm Springs (new BART rapid transit station opening in 2016), Centerville (existing commuter rail station) and Irvington (a funded future BART station).

Fremont's application for the Smart City Challenge is purposely aligned with its regionally designated Priority Development Areas (PDAs), as indicated in Figure 1, to showcase the integration of smart growth and modern transportation systems, addressing local issues related to congestion, safety and multimodal choices, as well as providing a national model for "strategic urbanism". The PDAs have been designated in the Metropolitan Transportation Commission's *Plan Bay Area* as the more efficient locations for new development in the region.

EXISTING TRANSPORTATION SYSTEM

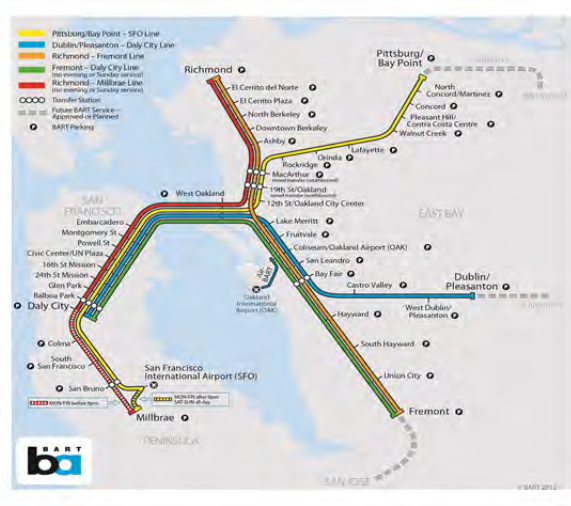
HIGHWAY, STREET AND BIKEWAY NETWORK

Fremont benefits from excellent access to regional transit systems, the region's major airports (in San Francisco, San Jose and Oakland), the Port of Oakland and a network of State and Interstate highways (SR 84, SR 238, SR 262, I-680 and I-880). There are 22 miles of State highways and 20 miles of Interstate (freeway) highways. The local highway network consists of 498 miles of streets and 219 traffic signals. Of those miles, 141 are on major arterials. Fremont has a Transportation Management Center serving as the central hub for signal timing adjustments and incident management using a central traffic management software system, 25 closed-circuit cameras and 15 miles of fiber optic communication cables.

Fremont's Bicycle and Pedestrian Master Plans, along with NACTO's Urban Street Design Guides are being used to implement "complete streets," providing improved conditions for walking and bicycling. In 2015, Fremont installed 10 miles of buffered bike lanes, enhancing the City's 160 miles of designated bikeways.

TRANSIT SERVICES

The Bay Area Rapid Transit (BART) provides rail service to Fremont along with more than 20 cities and four counties in the Bay Area. The Fremont BART station is a multimodal transit hub. An extension of BART further into Silicon Valley is under construction with a new South Fremont/Warm Springs station opening in 2016 and service to San Jose opening in 2018.





Fremont is also served by the Altamont Commuter Express (ACE) and Amtrak Capitol Corridor train lines, with both services stopping at the Fremont Centerville Station – a station owned by the City of Fremont. The 82 mile ACE corridor connects Stockton and San Jose. The Capitol Corridor links Fremont to Sacramento and San Jose using the same track as Amtrak's nationwide service.

The Alameda-Contra Costa Transit District (AC Transit) provides local bus service for Alameda and Contra Costa counties. The routes provide feeder service from Fremont neighborhoods to the BART station, and also connect major institutions, shopping areas and employment centers. In addition, the Dumbarton Express provides weekday bus service connecting Fremont across the Bay with Stanford University and Palo Alto.

Most of the proposed projects for the Smart City Challenge have a strong orientation toward improving accessibility with Fremont's three main transit hubs: Fremont BART, South Fremont/Warm Springs BART and the Fremont Centerville Station. Notably, the areas around each of these transit hubs are actively transforming into new urban communities consistent with Fremont's smart growth development strategies.

SHARED ECONOMY TRANSPORTATION OPTIONS

Fremont is committed to integrating with the sharing economy. Car-sharing is one of many sustainability strategies the City is supporting to promote transportation alternatives and reduce greenhouse gas emissions. Fremont has dedicated public parking spaces to Zipcar for their ridesharing vehicles located near the Fremont BART Station and at the Fremont Centerville Station. Ride-sourcing companies such as Uber and Lyft operate within Fremont and offer real-time, on-demand services. Fremont also falls within the LyftLine carpool matching market area.



ESTABLISHED INNOVATIVE LEADERSHIP

Fremont has firmly established itself as a leader in addressing major issues relevant to the Smart City Challenge. Among these are concern for the environment, climate change, community engagement and traffic safety. The examples described below serve to illustrate the "can do" spirit of Fremont's community and local government, and the leadership to be an agent for positive change.

SUSTAINABILITY

Fremont's General Plan includes a comprehensive sustainability strategy with elements related to climate change, transit-oriented development, transportation options, green buildings, waste reduction and recycling, energy conservation and renewable energy, water quality and conservation/recycling, urban forests and public health and wellness. The City has a full-time sustainability manager and has an Environmental Sustainability Commission to help advance ongoing efforts. Fremont has been selected as a semi-finalist in the Georgetown University



Figure 1: Planned Projects in Regionally Designated Priority Development Areas



LEGEND		
Project Status:	Centerville PDA	
	Downtown/City Center PDA	
	Irvington PDA	
	Warm Springs/South Fremont PDA	
[A] Project "Approved"		BART Station
[B] Project "Under Review"		
[U] Project "Under Construction" or anticipated in 2016		
		TRAIN Station



Energy Prize competition, a national challenge among 50 cities to dramatically reduce its energy consumption by the end of 2016.

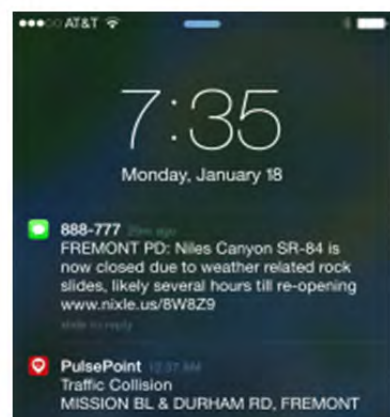
CLIMATE CHANGE, SOLAR POWER AND ELECTRIC VEHICLES

In 2012, Fremont adopted a Climate Change Action Plan, with the goal of reducing greenhouse gas emissions by 25 percent below 2005 levels. The transportation sector was identified as contributing to 58 percent of greenhouse gas emissions. Today, Fremont is tracking ahead of its target and has emerged as a leader in solar energy and electric vehicles.

Fremont is home to a large number of electric vehicle owners: 3,702 as of January 2016. With just 14 percent of Alameda County's overall population, Fremont residents own 32 percent of all of the electric vehicles that have been purchased within the County. Further, Fremont's 94539 zip code is home to more electric vehicle drivers than any other zip code in California. There are currently 74 electric vehicle charging stations available to the public throughout Fremont, with the total increasing to 147 later this year due to funded projects.

OPEN GOVERNMENT OPEN DATA

Fremont is a leader in open government and open data practices and is embarking on its strategic transparency initiative designed to quickly and easily provide data to citizens. Fremont is in the process of establishing a warehouse that will provide access to a variety of information and basic "raw data" that will enable more timely communication between the City and those wanting information. The Fremont Police Department uses the Nixle notification system, a free real-time communication service for critical situations such as severe weather events, evacuations, safety hazards and traffic advisories. The Fremont Fire Department uses a free smartphone application called Pulse Point providing users notifications such as structure fires, vegetation fires and traffic collisions. As part of the Smart City Challenge, we will collaborate with other agencies and innovators on how open data can enhance mobility services.



TRAFFIC SAFETY AND VISION ZERO

The Fremont Police Department effectively uses technology to help maintain traffic safety and manages the largest per capita deployment of automated cameras to enforce red-light running violations among all cities in California. However, like most cities, severe traffic crashes involving distracted driving, pedestrians, bicyclists and senior citizens are on the rise. In September 2015, the Fremont City Council adopted Vision Zero as the City's enhanced traffic safety improvement strategy.

According to the national Vision Zero Network, Fremont is among the first dozen leading cities in the nation to have earned designation as a "Vision Zero City". A "Vision Zero Fremont" action



plan is set for public release in March 2016 and will highlight how the deployment of technology solutions, along with continued efforts related to evaluation, engineering, enforcement and education can dramatically improve traffic safety.

A DIVERSE AND COMPASSIONATE COMMUNITY



Fremont takes pride in its extraordinary ethnic and cultural diversity. The 2010 census reveals a population including Non-Hispanic White (26 percent), Indian (18 percent), Chinese (18 percent), Hispanic (15 percent), Filipino (7 percent) and multiple races (6 percent). Further, Fremont has the largest population of Afghan Americans in the US.

Fremont is also home to several institutions serving special needs communities. These include the **Fremont Family Resource Center (FRC)**, **The California School for the Blind** and **The California School for the Deaf**. The FRC is located in downtown Fremont and serves as a one-stop shop for a wide range of social services with a focus on supporting low income residents and seniors. The Schools for the Deaf and Blind are located on adjacent campuses near the Fremont BART station and are considered among the best in the world for visually handicapped and deaf children.

On January 12, 2016, Mayor Bill Harrison and the City Council signed a Compassionate City Charter. Fremont has joined the movement of more than 50 countries and 70 cities that have pledged to follow the fundamental principles of universal justice and respect known as the golden rule as the key policy to achieve core objectives in their communities.

As part of the Smart City Challenge, special efforts will be made to connect with Fremont's low-income community members, seniors, persons with disabilities and residents speaking other languages. Convenient and affordable access to transportation serves as a "ladder of opportunity" for many members of the community. An important outcome of the Smart City Challenge is to facilitate social equity by supporting mobility for all ages, abilities and cultures.

INNOVATION ECOSYSTEM AND LEVERAGE OPPORTUNITIES

Fremont is one of the core cities in the global center of innovation known as Silicon Valley – Fremont is the second largest Silicon Valley city in both population and land area behind San Jose. Fremont is home to many innovation companies either headquartered in Fremont and/or with major research, development and advanced manufacturing operations. Significant technology companies in Fremont that align with the Smart City Challenge include: Tesla Motors, GenZe, Gridscape and Solar City.

Within Silicon Valley and the Bay Area, research and development work supporting the transportation sector is intensely concentrated and active. Aside from Tesla, other companies having transportation R&D facilities within thirty miles of Fremont include: Ford, General Motors, Google, Apple, Toyota, Honda, Nissan, Mercedes-Benz, Hyundai, Volkswagen, Denso, Elektrobit, Continental, Delphi, Bosch, Uber and Lyft.



An unmatched opportunity provided by Fremont for the Smart City Challenge is convenient proximity and access to Silicon Valley's innovation ecosystem that is strongly oriented to the priority goals related to urban automation, connected vehicles, intelligent infrastructure, electric vehicles, roadway electrification, smart grid and communication technology.

Our proposal also offers the powerful ability to leverage existing partnerships and compliment significant transportation investments. **Prospect Silicon Valley** is a non-profit organization that draws together innovators in technology, manufacturing, research and development, public administration and design. Active programs involve next generation transportation technologies and efforts to reduce carbon emissions. A multi-billion dollar project, with Federal assistance, is in construction to further extend **BART into Silicon Valley**. In Fremont, the project sets a foundation for envisioning new mobility connections to an existing end-of-the-line station (Fremont BART) and to another brand new station (South Fremont/Warm Springs BART). In 2014, voters approved **Alameda County Measure BB**, a new local funding source generating \$8 billion to enhance transportation services in Fremont and other East Bay cities. Transportation investment in Fremont includes local street pavement maintenance, complete streets and the new Irvington transit station (Fremont's third BART station).

AN EXPERIENCED AND COMMITTED CITY STAFF TEAM

The City of Fremont has a dedicated team of professionals with experience, creativity and passion to deliver on Fremont's vision to be a "sustainable, strategically urban, modern city." The Smart City Challenge is directly aligned with the City's vision and goals. Leaders from the City Manager's Office and all key City departments are committed to developing a modern transportation system that is safe, efficient, sustainable, convenient for all users, and supports the community's economic vitality.



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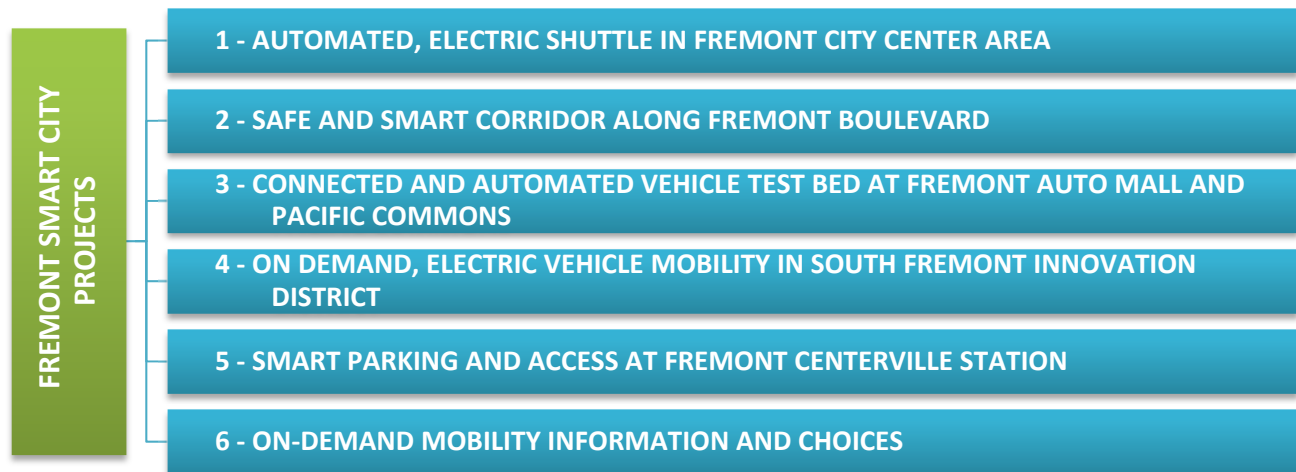
Fremont's City Engineer Hans Larsen leads the City's transportation programs and previously served as the Director of Transportation for the City of San Jose, from 2009 to 2015. Under his leadership, San Jose implemented a variety of transportation modernization efforts that included a new transportation management center, adaptive street lighting, multimodal street conversions, the introduction of car-sharing, bike-sharing and public EV charging systems, and demonstration partnerships involving connected vehicles. Mr. Larsen served as a member of the National Association of City Transportation Officials (NACTO) and prepared San Jose's Vision Zero traffic safety action plan.



SMART CITY APPLICATIONS

THE SMART CITY VISION FOR FREMONT

Building on its history of innovation and public-private partnerships, the City of Fremont has developed a proposal for six Smart City Challenge projects that align with its most critical needs and plans for development and growth in the city:



A detailed description of each of these projects is provided in this section. Figure 2 illustrates the location where each of the projects will be implemented in Fremont.

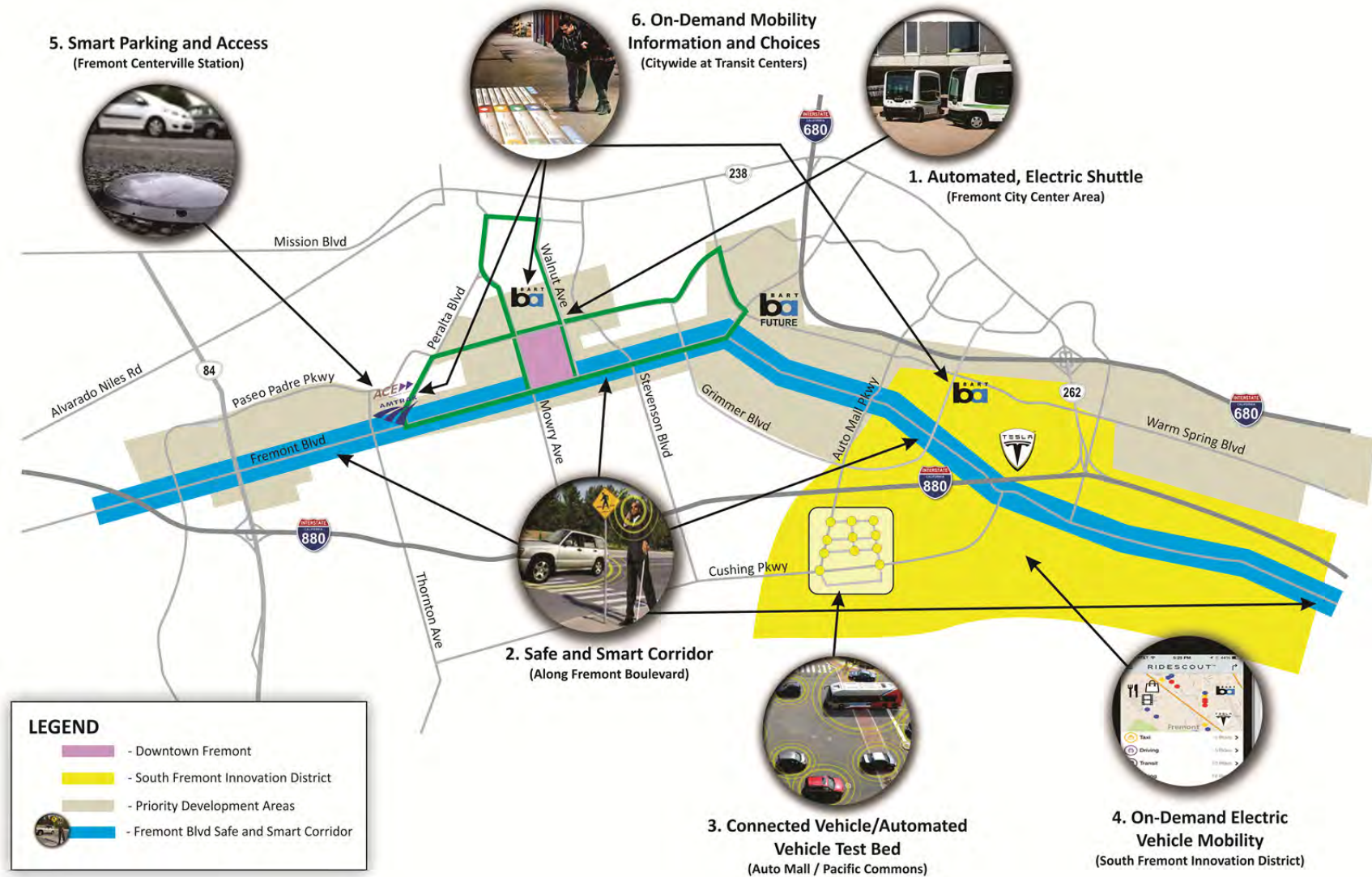
These projects are designed to meet goals that address the four most critical transportation needs of Fremont identified in the previous section:

- ✓ Increasing Traveler Safety
- ✓ Reducing Congestion
- ✓ Reducing Greenhouse Gas Emissions (and Climate Change)
- ✓ Enhancing Mobility for Special Needs Communities

The deployment of the **Automated, Electric Shuttle in Fremont City Center Area** will increase traveler safety by proving safe and reliable connections between BART and the various points within the Fremont City Center. It will also provide mobility for special-needs passengers in the City Center. By making transit more accessible, the project will reduce reliance on the automobile and reduce congestion. Because the shuttles will be electric, the project will also reduce greenhouse gas emissions and improve air quality in the local area.



Figure 2: Smart City Challenge Project Locations





The development of a **Safe and Smart Corridor along Fremont Boulevard** will use innovative “complete street” design in combination with smart transportation technologies to improve the safety of all pedestrians, bicyclists and travelers. The project would reduce the points of conflict between vehicles, pedestrians and bicyclists and provide advanced warning of the presence of pedestrians and bicyclists in or near crosswalks. This will be particularly beneficial for travelers with special needs such as the elderly, the blind, the deaf or people in wheelchairs or with other mobility impairments.

The project to provide a **Connected and Automated Vehicle Test Bed at Fremont Auto Mall and Pacific Commons** will help to improve traveler safety by introducing more car buyers to the safety features of new vehicles with CV/AV technology. The collision-avoidance features of these new vehicles will have immediate safety benefits by reducing collisions and immediate congestion-reduction benefits by reducing delay caused by collisions. Ultimately the CV/AV technologies will produce efficiency in the use of street space once there is a high penetration rate and reduce overall congestion. New cars with CV/AV technologies may also improve mobility for travelers with special needs if the CV/AV features allow drivers to overcome disabilities by using automation features.

The **On-Demand, Electric Vehicle Mobility in South Fremont Innovation District** will reduce congestion by making it easier for employees in the Innovation District to get from BART to their jobs and avoid commuting to work by car or by getting from their place of work to food services at Pacific Commons. Because many of the on-demand services would use electric vehicles, the project would also reduce greenhouse gas emissions and improve local air quality. Electric vehicle shuttles supporting the manufacturing operations of businesses in the Innovation District would also reduce greenhouse gas emissions and improve local air quality by substituting electric vehicles for gas-powered vehicles for goods movements.

Smart Parking and Access at Fremont Centerville Station will reduce congestion and greenhouse gas emissions by increasing the use and productivity of the parking spaces at Fremont Centerville Station for transit and ridesharing trips. Variable pricing will be used to generate the highest possible level of use of the spaces by people using the highest occupancy modes.

By increasing the availability of real-time information about transit and shared-use services in Fremont, the project to provide **On-Demand Mobility Information and Choices** will reduce congestion and greenhouse gas emissions by increasing the use of transit. By making sure that the information is disseminated in a way that is usable by people who are blind, deaf, mobility impaired, low-income or have limited use of English; the project will provide more safe and reliable mobility for special-needs populations.



DATA TO SUPPORT THE PROJECTS AND MONITOR THEIR SUCCESS

The Fremont Smart City Challenge projects will use a variety of technologies to provide the data needed to support the project and to monitor their performance relative to the project goals and objectives. The six projects will produce a sensor-rich setting that collects and transmits real-time data on the following:

- Traffic volumes and speeds
- Location of pedestrians, bicyclists and people in wheelchairs
- Location and ridership of transit vehicles and shared-use shuttles
- Location and destinations of passengers seeking on-demand transit or shared-use service
- Parking space occupancy
- Availability and use of shared vehicle services – cars, vans, bicycles, etc.

The sensors will be a combination of stand-alone sensors or video cameras placed at strategic locations, the GPS and passenger counting equipment on transit vehicles and the individual smart phones and navigation devices of travelers.

Much of the same data used to support the project applications will also be used by the City of Fremont and its partners to monitor the performance of the projects. Shifts in travel behavior in response to the projects will be used to determine the reduction in traffic and congestion and the reduction in use of gas-powered vehicles. Improvements in mobility for special-needs populations will be judged on the basis of recorded use of the project services by registered users with special needs and by information provided by the partnership agencies supporting these populations. Improvements in traveler safety will be determined by monitoring of the reported collisions and the reports on the nature of injuries.

TECHNICAL, POLICY AND INSTITUTIONAL RISKS

The City of Fremont has assembled a strong set of partners to address potential technical, policy and institutional risks. These partners are described in the Partner Profiles section of the application. These partners bring technical expertise in the technologies and services proposed in this application to ensure that all aspects of the project are appropriately designed and thoroughly tested before implementation. The team's technical experts include transportation consultants, academic research institutions, transit providers, shared-use service providers and technology suppliers. To reduce policy and institutional risks, the City of Fremont has gained the support of public and private sector agencies whose purpose it is to achieve policy consistency and encourage multi-disciplinary, public-private collaboration and cooperation. The Metropolitan Transportation Commission and the Alameda County Transportation Commission provide a forum for the public sector agencies and service providers to resolve conflict and to achieve consensus. Prospect Silicon Valley as a partner will have the role of insuring strong participation from the private sector and for arranging for public-private collaboration and partnership.



#1 - AUTOMATED, ELECTRIC SHUTTLE

FREMONT CITY CENTER AREA

The Automated, Electric Shuttle project will demonstrate urban automation, roadway electrification, “first-mile/last-mile” access to transit, and user-focused mobility, in particular for underserved communities, seniors and persons with disabilities. The shuttle service will be designed to address the need for short transit trips within the core area of a suburban city with particular emphasis on connections to the downtown Fremont BART station. These short trips may be to get people already in the city to places to shop, work or conduct personal business within the city center, or may be the first or last mile of a longer transit trip.

The shuttle will operate at the highest level of automation currently permitted by California law (will require attendant). The service will represent an extension of AC Transit pilot of Flex service in Fremont that provides flexible demand-responsive routing for pick-up and drop-off service to the BART station. The project will also include BART-to-Shuttle communications to enable the service attendant to hold the shuttle for the next imminent BART train arrival.

The service will be designed with the needs of several special needs populations in the Fremont City Center in mind. These users include students and staff at the California School for the Blind, the California School for the Deaf, the Family Resource Center and the Centerville and Irvington Town Centers. In addition, this project will support the strategically urban vision outlined in Fremont’s Downtown and City Center Community Plans.

HOW WILL THIS PROJECT BENEFIT THE COMMUNITY?









EXISTING CITY NEED	SOLUTION
Mobility limitations of unique special - needs populations	✓ Operationally customizable transportation platform that can be designed to address the specific mobility limitations of Fremont’s special needs populations
Transit linkage gaps between BART and major City Center origins or destinations	✓ Flexible shuttle service to efficiently serve locations currently not well-integrated into the transit network
Reliance on polluting and inefficient transportation technology	✓ An all-electric zero-emissions transportation platform to serve as a model for future transportation developments in suburban oriented areas
Limited EV range for transit vehicles	✓ Employ en-route battery charging techniques to enable all-day, continuous operations

OVERCOMING OBSTACLES

POTENTIAL PROJECT OBSTACLES	SOLUTION
Safety concerns about an autonomous vehicle operating in a public environment	✓ Simplify the operating environment to the extent possible (limit operating speeds, predefine and simplify routes, etc.) ✓ Testing of automated shared use vehicles at the GoMentum test bed site before application



SMART CITY VISION CONSISTENCY

 Vision Element #1 Urban Automation	<ul style="list-style-type: none"> ✓ Automated, electric transit shuttle service between BART and key City Center origins and destinations ✓ Testing of automated shared use vehicles at secure test bed site before application
 Vision Element #2 Connected Vehicles	<ul style="list-style-type: none"> ✓ Transit vehicles with connected vehicle technology for greater safety and security through communications and collision avoidance
 Vision Element #5 Urban Analytics	<ul style="list-style-type: none"> ✓ Dynamically routed vehicles based on requests for service using app
 Vision Element #7 Strategic Business Models & Partnering	<ul style="list-style-type: none"> ✓ Partnering with special needs groups, AC Transit, GoMentum, EasyMile, Gridscape
 Vision Element #8 Smart Grid, Roadway Electrification, & EVs	<ul style="list-style-type: none"> ✓ Automated, electric transit shuttle service between BART and key destinations ✓ Recharging through inductive power transfer at stations
 Vision Element #9 Connected, Involved Citizens	<ul style="list-style-type: none"> ✓ Connection with the special need groups – low income, seniors, blind, deaf, mentally disabled, English as a second language - connect during the planning stages to route appropriately and understand specific needs
 Vision Element #10 Architecture & Standards	<ul style="list-style-type: none"> ✓ Use of universal designs for stations and vehicles for Automation and shuttle vehicles ✓ Use of Connected Vehicle communications standards and prove use cases ✓ Compliance with the Bay Area's existing Regional ITS Architecture for transit standards ✓ Use of SAE J2374 Location Referencing Message Specification for Automatic Vehicle Location
 Vision Element #12 Smart Land Use	<ul style="list-style-type: none"> ✓ First-mile and last-mile services to support transit and efficient land uses

TRANSFERABILITY OF INNOVATION

The need for better approaches to providing short transit trips is almost universal in mid-sized suburban cities, and this project could revolutionize how this need is met efficiently and cost-effectively and in a way convenient for the users. The application in Fremont is also specifically intended to address community members with special mobility needs. Like in other suburban cities around the US, these populations are the most transit dependent, and this project will greatly enhance access, mobility and safety.



#2 - SAFE AND SMART CORRIDOR

FREMONT BOULEVARD

The Safe and Smart Corridor project will demonstrate “Complete Streets” design concepts, sensor-based infrastructure, communication systems, smart lighting, adaptive signal control and connected vehicles/infrastructure/ devices to achieve a number of objectives for the corridor. These include supporting Fremont’s Vision Zero traffic safety goals, efficient multimodal mobility, sustainability and “strategically urban” development along Fremont Boulevard. The project will be implemented in the portion of Fremont Boulevard between its two interchanges with I-880 on the north and south sides of Fremont. The portion of Fremont traversed by this segment of Fremont Boulevard includes four Priority Development Areas (Centerville, Downtown/City Center, Irvington and Warm Springs), designated by the City and by the Metropolitan Transportation Commission – the MPO for the region.

This project will employ advanced sensor technologies to identify the number and location of pedestrians and bicyclists and use this real-time data to alert traffic signal controllers and vehicle operators of their presence. This will provide adequate opportunity to adjust signal timing for street crossings and avoid collisions between vehicles and pedestrians or bicyclists by triggering flashing alerts. This will be combined with sensor data for traffic volumes to enable the application of adaptive signal timing and transit signal priority that is also safe for pedestrians and bicyclists. The project will also include the installation of “smart street lighting” that can change the amount, intensity or color of lighting based on the presence of cars, buses, pedestrians or bicyclists. The data will come from sensors for each mode and will allow lighting to be adapted to the need at any particular time. This will both increase safety and reduce energy use.

Additional safety for travelers by all modes will be provided by sensors to detect speeding and red-light running. This information will be used by law enforcement to identify areas for more active police presence to reduce collisions from poor or reckless driving.

HOW WILL THIS PROJECT BENEFIT THE COMMUNITY?








EXISTING CITY NEED	SOLUTION
Concentration of collisions involving pedestrians and bicyclists	<ul style="list-style-type: none">✓ Sensors and communications to drivers for collision avoidance✓ Connected vehicle communications to provide warning to drivers of pedestrians and bicyclists in or near crosswalks
Lack of balance for all modes	<ul style="list-style-type: none">✓ Complete Streets design supported by traffic management and collision avoidance technology
Inefficient movement of people and vehicles	<ul style="list-style-type: none">✓ Adaptive signal timing to improve efficiency supported by sensor data



OVERCOMING OBSTACLES

POTENTIAL PROJECT OBSTACLES	SOLUTION
Achieving agreement on a reallocation of street space use among modes	✓ Advance public input techniques will be used to allow the people that will be affected to express their desires and concerns and influence the design

SMART CITY VISION CONSISTENCY

 Vision Element #1 Urban Automation	<ul style="list-style-type: none"> ✓ Sensors to detect pedestrians, bicyclists and people in wheelchairs to support safer traffic signal operation and to avoid crashes by cars with connected vehicle technology ✓ Roadway sensors to monitor traffic in real-time for adaptive signal timing ✓ Speed sensing technology to feed intelligence to police for where to increase enforcement - safety monitoring.
 Vision Element #2 Connected Vehicles	<ul style="list-style-type: none"> ✓ Instrumentation of roadway and traffic control system to support CV/AV services
 Vision Element #5 Urban Analytics	<ul style="list-style-type: none"> ✓ Adaptive signal timing and transit signal priority to produce more efficient use of roadway space
 Vision Element #7 Strategic Business Models & Partnering	<ul style="list-style-type: none"> ✓ Sensor and traffic-control-oriented services - Iteris, LogicWorks, Silver Spring Networks
 Vision Element #9 Connected, Involved Citizens	<ul style="list-style-type: none"> ✓ Advanced citizen input techniques for design improvements
 Vision Element #11 Low-Cost, Efficient, Secure, & Resilient ICT	<ul style="list-style-type: none"> ✓ Smart and efficient lighting system
 Vision Element #12 Smart Land Use	<ul style="list-style-type: none"> ✓ Complete Street design to support multi-modal service for higher density housing and mixed use

TRANSFERABILITY OF INNOVATION

This project will use smart technologies to support the implementation of a “Complete Streets” design for an older mixed-use suburban street, making it safer for pedestrians and bicyclists and improving the quality of life for people who shop, work or live along the corridor. This need for transforming the character of an older mixed-use street is almost universal in suburban cities across the US. Advanced sensors, communication systems, smart lighting, adaptive signal control and connected and automated vehicle technologies are already available for this application. This project will demonstrate the feasibility of the concept and its benefits improving safety for pedestrians and bicyclists.



#3 - CONNECTED VEHICLE/ AUTOMATED VEHICLE TEST BED



FREMONT AUTO MALL/PACIFIC COMMONS

The Connected Vehicle/Automated Vehicle (CV/AV) Test Bed project will accelerate the development of CV/AV technology, integration, standards and citizen engagement and education in an area concentrated with auto dealerships and a regional shopping center. Initial testing of CV/AV technology could include self parking. The test bed will also

offer the public the opportunity to learn about and experience firsthand the benefits and promise of CV/AV in a safe, controlled environment. This project will be located at the Fremont Auto Mall, one of the largest concentration of auto dealers in the Bay Area and Pacific Commons, a regional retail “power center”. Vehicle makes represented at the Auto Mall include BMW, Chevrolet, Honda, Hyundai, Mercedes Benz, Nissan, Porsche and Toyota.

In this project, the road network in the Fremont Auto Mall and Pacific Commons area of Fremont will be instrumented with the Dedicated Short-Range Communication (DSRC) technology, detection sensors and traffic control equipment necessary to enable use of the vehicle-to-infrastructure (V2I) communication to demonstrate the CV/AV features of new cars and trucks being sold by the Auto Mall dealers. This will allow customers to test drive cars or trucks in a street environment that will allow them to experience the features of the new vehicles and how they can provide additional information about what is happening at street intersections and roadway segments ahead and the collision-avoidance capabilities provided by the vehicle-to-vehicle (V2V) communications. Customers will also be able to test special features such as self-parking in reserved areas of Pacific Commons. It will also allow the City of Fremont to monitor the performance of the communication system, the traffic control system and the vehicles being tested.







HOW WILL THIS PROJECT BENEFIT THE COMMUNITY?

EXISTING CITY NEED	SOLUTION
Public lacks awareness of and direct experience with CV/AV	✓ Provide an accessible instrumented environment where the public can learn about and experience the features and benefits of CV/AV technologies
Lack of City testing of DSRC and CV/AV V2I and V2V technologies and control strategies	✓ Provide a test bed for the City of Fremont to observe and evaluate DSRC and CV/AV V2I and V2V technologies and control strategies
Inefficient utilization of available public parking at Pacific Commons shopping mall	✓ Demonstrate self-parking that can manage vehicle parking more efficiently

**OVERCOMING OBSTACLES**

POTENTIAL PROJECT OBSTACLES	SOLUTION
Safety concerns about an autonomous vehicle operating in a public environment	✓ Simplify the operating environment to the extent possible (limit operating speeds, predefine and simplify routes, etc.)

SMART CITY VISION CONSISTENCY

 Vision Element #1 Urban Automation	<ul style="list-style-type: none"> ✓ Automated self-parking at Pacific Commons ✓ Testing of automated vehicles at secure test bed site before application
 Vision Element #2 Connected Vehicles	<ul style="list-style-type: none"> ✓ Instrumentation of roadway and traffic control system to support CV/AV services
 Vision Element #7 Strategic Business Models & Partnering	<ul style="list-style-type: none"> ✓ Prospect Silicon Valley, Pacific Commons and Auto Mall Dealers
 Vision Element #9 Connected, Involved Citizens	<ul style="list-style-type: none"> ✓ Advanced citizen input techniques for service improvements at Pacific Commons ✓ Demonstration of the opportunities and benefits can engage people in the technology planning
 Vision Element #10 Architecture & Standards	<ul style="list-style-type: none"> ✓ Use of the Connected Vehicle Reference Implementation Architecture (CVRIA) to maximize interoperability and support scalability of the pilot ✓ Maintain consistency with the region's existing Bay Area ITS Architecture, National ITS Architecture, and guidance of the CVRIA ✓ Applying IEEE 1609 related standards to ensure security and privacy for all V2V, V2I, and V2X DSRC transmissions ✓ Utilizing SAE J2735 message sets, including Basic Safety Message, Map Data, Signal Phase and Timing, and Traveler Information Message, for DSRC and other wireless communications technologies
 Vision Element #11 Low-Cost, Efficient, Secure, & Resilient ICT	<ul style="list-style-type: none"> ✓ CV/AV infrastructure part of the sensor-rich network as SMART poles. ✓ Use of SMART poles to communicate with one another, to the central system and provide infill cellular or Wi-Fi Communications. Connect to existing wireline communications where available and wireless as back-up.

TRANSFERABILITY OF INNOVATION

The distinguishing feature of the CV/AV Test Bed project is its emphasis on providing the public a way to access and experience firsthand what a connected and autonomous vehicle future could look and feel like. Too often, demonstration projects and test beds remain inaccessible to the general public. The success of connected and autonomous vehicles, however, is highly dependent on wide user acceptance and penetration of the technology. The Fremont CV/AV Test Bed project will help bring the CV/AV future to the public and engage with them in its evolution.



#4 - ON-DEMAND, ELECTRIC VEHICLE MOBILITY

SOUTH FREMONT INNOVATION DISTRICT



The On-Demand Electric Vehicle Mobility project for the South Fremont Innovation District will advance on-demand mobility and information and payment systems supporting BART, AC Transit, carshare, bikeshare and other ridesharing services. This will include the addition of electric shuttle services publicly provided; privately provided shared-use services such as Lyft, Lyft Line, ZipCar, E-Bikes (electric bike and scooter sharing) and Bike Share. The project will also include smart-phone based mobility management services that identify all of the on-demand and schedule services available for a particular trip. This project is intended

to be a step toward a larger future vision with automated vehicles.

The Innovation District is a center of over 30,000 technology jobs with a possibility of up to 20,000 additional employees with the full planned build-out. The project will connect commuters from the Warm Springs BART Station to jobs in the Innovation District, including employees and suppliers at Tesla and other high-tech manufacturers. Additionally, the on-demand electric vehicle services will connect workers in the Innovation District to dining, shopping and entertainment activity centers in and around Pacific Commons. The project will also enable electric goods movement between local suppliers and Tesla and other manufacturers.

The project will also include Bus/Shuttle-to-BART communications to enable an expected BART train arrival alerts that will allow the service operator to hold buses or shuttle for the train arrival.

HOW WILL THIS PROJECT BENEFIT THE COMMUNITY?

EXISTING CITY NEED	SOLUTION
Transit linkage gaps between major transit nodes and South Fremont commercial and industrial destinations	✓ Flexible demand-responsive shuttle service, carshare, bikeshare or shared-use mobility services to accommodate efficient connections between major transit nodes and business centers
Lack of connectivity between Innovation District business and activity centers around Pacific Commons	✓ An on-demand transportation service to connect spread-out transit-unfriendly activity centers can serve as a model for improving mobility and access in typical suburban-oriented areas
Local goods movement between suppliers and manufacturers in the Innovation District does not live up to the moniker	✓ Utilize electric goods movement vehicles to shuttle supplies and equipment between local suppliers and manufacturers

**OVERCOMING OBSTACLES**

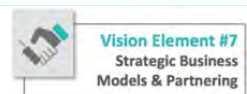
POTENTIAL PROJECT OBSTACLES	SOLUTION
Safety concerns about an autonomous vehicle operating in a public environment	✓ Simplify the operating environment to the extent possible (limit operating speeds, predefine and simplify routes, etc.)

SMART CITY VISION CONSISTENCY

- ✓ Electric transit shuttle service between BART and key destinations
- ✓ Electric goods movement shuttle between local suppliers and Tesla or other manufacturers
- ✓ A fleet of vehicle types that serve different needs



- ✓ Electric goods movement shuttle between local suppliers and Tesla or other manufacturers operating on intelligent scheduling for manufacturing processes



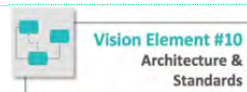
- ✓ Tesla, GenZe, Lyft, Prologis, Pacific Commons



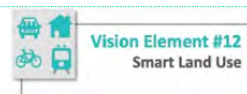
- ✓ Electric goods movement fleets of various vehicle types between local suppliers and Tesla or other manufacturers



- ✓ Involvement of the Fremont Chamber of Commerce, Tesla, Prologis, Pacific Commons, Prospect Silicon Valley and the numerous service providers



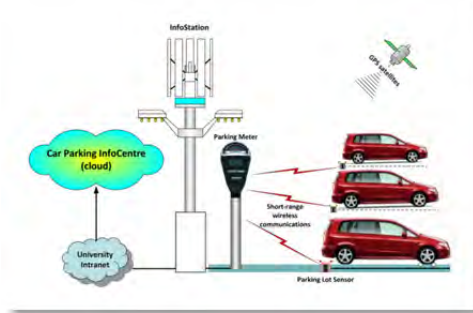
- ✓ Implement data exchanges between regional partners using common communication protocols and XML data format



- ✓ Providing efficient transportation to support existing industrial and commercial uses but also the 4000 new housing units to achieve more mixed use and jobs-housing balance

TRANSFERABILITY OF INNOVATION

The need for better approaches to providing short transit trips almost universal in mid-sized suburban cities, and this project could revolutionize how this need is met efficiently and cost-effectively and in a way convenient for the users. South Fremont and the Innovation District follow a land use and development pattern common to many suburban-oriented cities throughout the nation that are struggling to provide mobility alternatives to the private automobile. Demonstrating that on-demand services can serve as a viable mobility alternative to private vehicle use in South Fremont will show that such approaches can be successfully applied in many other locations and contexts.



#5 - SMART PARKING AND ACCESS

AT FREMONT CENTERVILLE STATION

The City of Fremont owns and maintains the parking lot adjacent to the train station in the Centerville area of the city. The station serves two different commuter rail lines as well as AMTRAK that connect Fremont with communities throughout the South Bay and the East Bay and Northern California. Use of the lot is not restricted to passengers on these rail services and it also provides a park-and-ride location for carpools, vanpools and pick-up by private employers in the Fremont Innovation District, in Santa Clara County and on the Peninsula. This project will increase the utilization of the lot and increase vehicle occupancy by providing real-time information to potential users about the availability of spaces and the arrival and departure times of trains and shuttles serving the lot.

The approach for the project is to install sensors in the parking lot to supply real-time information about space occupancy and smart metering technology to allow variable pricing of space use dependent on overall demand and the VMT-reducing potential of the parker. The parking sensors could also help enforce parking regulations. The project would also include installation of automated vehicle location (AVL) and automated passenger counting (APC) technologies to determine next train/shuttle and capacity information. Finally, the project would include communication technologies to supply information about parking availability and price and the timing and space availability for transit services and shuttles servicing the lot. This information would be communicated by a smart phone app and at electronic display signs near the station and would also facilitate use of the lot by local businesses during evenings and weekends when the lot is not supporting transit commuters.

HOW WILL THIS PROJECT BENEFIT THE COMMUNITY?





EXISTING CITY NEED	SOLUTION
Lack of real-time information for the public about parking availability at Fremont's Centerville Transit Center	✓ Use sensor-based technology to provide real-time information on parking space use and timing of transit or shuttle pick-ups
Need for more productive use of the parking spaces at the Centerville Transit Center to support higher vehicle occupancy	✓ Use sensor-based technologies and smart meters to manage the utilization of spaces including dynamic pricing of space use
Need for better management of the space use at the Centerville Transit Center to support Fremont employers and businesses	✓ Use sensor-based technologies and smart meters to manage who has access to spaces allowing preference for Fremont businesses/employees



OVERCOMING OBSTACLES

POTENTIAL PROJECT OBSTACLES	SOLUTION
Acquiring real-time information about the arrival time and space availability on transit services and private shuttles	✓ Public-private collaboration group to support the application and operation of the project

SMART CITY VISION CONSISTENCY

 Vision Element #3 Intelligent, Sensor-Based Infrastructure	✓ Sensor-based infrastructure and user focused mobility choices at Centerville transit center to facilitate multimodal access and parking management, including a variable parking pricing system
 Vision Element #4 User-Focused Mobility Services & Choices	✓ Traveler information about parking availability and price at the station ✓ Traveler information about transit, carpooling and vanpooling services from the station
 Vision Element #5 Urban Analytics	✓ Technology options to help manage the use of the parking for multiple modes - ACE train, shuttles to private employers, AC Transit, carpool and vanpool
 Vision Element #7 Strategic Business Models & Partnering	✓ Logicworks as the sensor, parking pricing technology and management partner ✓ Prospect Silicon Valley to facilitate the public-private collaboration; Centerville Business Association to liaison with local businesses

TRANSFERABILITY OF INNOVATION

This project will apply sensor and communication technologies to allow the City of Fremont to more effectively manage a parking resource to increase the productivity and effectiveness of the facility in reducing commute vehicle occupancy, vehicle miles of travel and greenhouse gas emissions. Many mid-sized suburban cities have parking facilities that can serve multiple commute options, and this project will demonstrate how technology can be used to facilitate the management of the space use and provide information to potential users. The project will also demonstrate how a public-private, multi-agency collaboration can result in more productive and effective use of scarce resources.



#6 - ON-DEMAND MOBILITY INFORMATION AND CHOICES

This project will use advanced sensor and communication systems to provide more up-to-date and detailed information about transit and shared-use services to potential users throughout the City. This application will provide information using a variety of media including mobile devices, display screens at key activity centers and transit stations and small solar-powered real-time arrival signs on bus poles and at shelters.

The project will provide information about services available, the time of the next train or bus, space availability on the train or bus, and the availability of parking at transit stations and park-and-ride facilities. At Smart Mobility Hubs at the BART and Amtrak/ACE stations, information will also be provided about private services such as bikeshare, carshare and shared-use services such as Uber or Lyft.

The information services will be designed with several special needs populations in the Fremont City Center in mind. These include students and staff at the California School for the Blind, the California School for the Deaf and the Family Resource Center. Because of the characteristics of these potential users, it will be important that information be provided visually, verbally and in multiple languages. The project will also include Wi-Fi on all buses and at the transit centers to improve the delivery of information to transit users and to reduce the cost for data sharing to benefit low-income users.

HOW WILL THIS PROJECT BENEFIT THE COMMUNITY?

EXISTING CITY NEED	SOLUTION
Lack of real-time information about transit linkage between major origins and destinations	✓ Real-time transit service information from all providers using a variety of formats and media
Lack of information about the full range of available mobility services	✓ Consolidated information about all publicly available transit and shared use services available
Mobility and communication limitations of special-needs population	✓ Providing easy-to-understand real-time information on mobility services using a variety of electronic media

OVERCOMING OBSTACLES

POTENTIAL PROJECT OBSTACLES	SOLUTION
Collecting and providing real-time information about the full range of public and private services	✓ Developing a public-private partnership group to provide and coordinate transit and shared-use services and information in Fremont
Providing information in a form that potential users with a variety of disabilities can receive and understand	✓ Providing easy-to-understand information in a visual and audio format in multiple languages



SMART CITY VISION CONSISTENCY



Vision Element #3
Intelligent, Sensor-
Based Infrastructure

- ✓ Advanced sensor system to determine location and occupancy of trains and buses



Vision Element #4
User-Focused Mobility
Services & Choices

- ✓ Smart Mobility Hubs with traveler information about a full range of mobility services - transit, bikeshare, carshare, shared ride
- ✓ Real-time information about next train or next bus and available capacity
- ✓ Dynamic messaging to subscribers about transit parking availability



Vision Element #7
Strategic Business
Models & Partnering

- ✓ Open data policy of transit providers to expand ability of private app developers to push out information
- ✓ Transit Screen, BART and AC Transit as partners



Vision Element #9
Connected, Involved
Citizens

- ✓ Outreach to special-needs populations will help to develop appropriate information-deliver mechanisms

TRANSFERABILITY OF INNOVATION

Several aspects of this project will revolutionize how traveler information is collected and distributed. This will be a collaborative, public-private venture designed to provide real-time information to potential users on all publicly available travel modes for trips within the city. It will not only provide information on the next bus or train at a particular location, but also how full the bus or train is and whether it might be better to wait for another one. This will be particularly important for BART and ACE trains that can be quite full during the peak of the commute periods.



PARTNER PROFILES

Fremont has garnered the support of a wide variety of public and private partners to support its Smart City effort. Some of these organizations have already submitted formal letters of support for the City's application which may be found in Appendices A and B (these organizations are denoted with an * next to their names in this section).

TRANSPORTATION AGENCIES



Metropolitan Transportation Commission (MTC)* is the metropolitan planning organization for the nine-county Bay Area. MTC's role in the implementation of Fremont's Smart City projects will be to coordinate the projects with other regional efforts to ensure consistency. This will be particularly important given Fremont's location at the boundary of Alameda and Santa Clara Counties and its location on regional rail services such as BART, ACE and The Capitol Corridor (Amtrak).



Alameda County Transportation Commission (Alameda CTC)* is responsible for creating and implementing transportation programs, coordinating transportation planning efforts, and programming local, regional, state and federal funding. The Alameda also CTC oversees expenditure plans for locally-approved transportation taxes, including Measure BB, which is projected to generate approximately \$8 billion in revenue. The 2014 Transportation Expenditure Plan for Measure BB includes \$77 million in funding for Technology, Innovation and Development. The City of Fremont will work with the Alameda CTC to leverage any federal grants for Smart City applications with Measure BB Technology, Innovation and Development Program funds.



AC Transit* is a publicly owned bus system, serving 13 cities and adjacent unincorporated areas in Alameda and Contra-Costa counties. AC Transit is currently planning a pilot of a "Flex" transit service in central Fremont which could be incorporated with Projects #1, 4 and 6. AC Transit has also proposed that Transit Signal Priority be added to Project #2, among other ideas. AC Transit maintains a Data Resource Center that includes an Application Program Interface (API), General Transit Feed Specification (GTFS) data and other resources to support the development of mobile applications, web-based applications and other technologies. These will be important resources as Fremont develops Project #6.



Bay Area Rapid Transit (BART)* is a heavy-rail and subway system that connects San Francisco with cities in the East Bay and northern San Mateo County. BART functions like a metro system through its aesthetics and carrying capacity, and as a commuter rail through its pricing model. Two of Fremont's Smart City applications, Projects #1 and #4, will serve BART stations. The City will work with BART as the concepts for these services are refined to identify appropriate pickup/drop-off locations and address other practical considerations. BART also maintains a Developer Program including a real-time BART API, GTFS and other information resources. These will also be important resources as Project #6 is implemented.



RESEARCH AND CONSULTING INSTITUTIONS



Transportation Sustainability Research Center (TSRC)* is managed by the Institute of Transportation Studies of the University of California, Berkeley and has been a leading center in researching, designing and evaluating innovative and sustainable transportation solutions. TSRC is expected to lead the task of evaluating the VMT, GHG, safety and other impacts of Fremont's Smart City applications. In this role they will also help specify the data to be collected for each project. TSRC will also bring its experience with shared mobility services, alternative fuel vehicles and connected/automated vehicle technologies to the team. They will assist in designing Smart Mobility Hubs as part of Project #6 and selecting appropriate sensor technology for Project #2.



California Partners for Advanced Transportation Technology (PATH)*, is research and development program of the University of California, Berkeley focused on Intelligent Transportation Systems. PATH will bring expertise in the areas of automated and connected vehicles, traffic operations and modal applications to the Fremont Smart City team. PATH will consult on developing a roadway and traffic control system to support connected and automated vehicle services for Project #2 and #3. PATH will also help select appropriate sensor technology for pedestrian or bicyclist detection, real-time traffic detection and speeds.



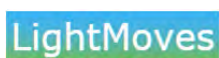
Prospect Silicon Valley (ProspectSV)*, is a non-profit Silicon Valley-based technology commercialization catalyst for creating smarter and cleaner cities. ProspectSV provides access to partners, market connections and facilities with industrial and lab space, including the vehicle simulation and traffic signal test labs in San Jose, California. The Fremont team will look to ProspectSV for assistance in developing the new institutional arrangements required for some of our proposed projects. These would include, for example, partnerships between the City of Fremont, an automated vehicle technology company, and potentially a transit operator for Project #1. With its experience in running a technology demonstration space, ProspectSV could help engage the community in technology planning for Project #3. It could facilitate arrangements among a fleet operator, the City and private businesses to provide on-demand, electric vehicle mobility for Project #4.



GoMentum Station*, located in the Bay Area (Concord) and managed by the Contra Costa Transportation Authority, is a 5,000-acre site with 20 miles of paved roadway for the research, development, testing, validation and commercialization of Connected Vehicle (CV) applications and Autonomous Vehicles (AV) technologies. GoMentum Station will provide the secure test bed site for automated vehicles prior to implementation on city streets. These would include the automated, electric shuttle in Project #1, and potentially the demand-responsive, electric vehicles used for Project #4.



DKS Associates* is a transportation planning and engineering firm with expertise in Smart Cities technologies. DKS can provide expertise in instrumenting roadway and traffic control systems to support connected and autonomous vehicles (Projects #2 and #3), designing smart and efficient lighting systems for Project #2, as well as planning and technology evaluation for Project #5. DKS Associates can also provide Complete Street design to support multi-modal service for higher-density housing and mixed use in the Smart City project areas.



LightMoves* provides safe and sustainable design consultation and lighting and energy management services to public agencies and private corporations. LightMoves will provide planning and design services for the smart street lighting element of Project #2 and overall program support to Fremont's Smart City projects.

VEHICLE AND MOBILITY TECHNOLOGY



Tesla Motors is an American company which produces semi-autonomous electric vehicles, batteries and electric vehicle engine components. Tesla Motors is a leader in eco-friendly and green technology and innovation and chose to build its Model S assembly plant in Fremont, California. The Fremont Smart Cities team will continue to seek the involvement of Tesla as a preeminent transportation and technology firm located in the South Fremont Innovation District. Tesla's involvement could be invaluable in providing outreach to the business community and in planning an on-demand mobility service that their employees would be likely to use (Project #4). Tesla may also participate in the demonstration of automated and connected vehicle technology (Project #3).



EasyMile* is a joint venture between a vehicle manufacturer (Ligier Group) and a robotics company (Robosoft) that produces a driverless electric shuttle vehicle designed to cover short distances and predefined routes in multi-use environments. EasyMile is currently prototype testing its EZ10 Shared Driverless Vehicles at GoMentum Station. EasyMile is representative of the vehicle technology needed to provide an automated, electric transit shuttle service between BART and key destinations (Project #1) or an automated, electric goods movement shuttle between local suppliers and Tesla or other manufacturers (Project #4). EasyMile may be just one of several vehicle types in a fleet that serves different needs for Fremont's Smart City applications.



GenZe*, located in Fremont, manufactures and assembles electric bicycles and scooters. GenZe is another likely vehicle technology candidate for Fremont's Smart City applications. In particular, GenZe electric scooters or bicycles could be part of the solution to Project #4 for personal mobility or small-package goods movement. GenZe vehicles also lend themselves to sharing economy applications.



Lyft*, a privately-owned transportation network company based in San Francisco, utilizes a mobile application to provide on-demand, point-to-point ride services. Lyft also provides a carpool matching service known as Lyft Line that facilitates shared rides for multiple users at a reduced price. Lyft has recently announced a strategic partnership and investment from General Motors to develop a network of on demand, autonomous vehicles (GM also plans to establish a series of national rental hubs where Lyft drivers can access short-term vehicle rentals). Lyft could potentially contribute to the fleet of vehicles serving different needs for Project #4. Lyft-facilitated services will also be on the menu of choices for travelers getting around within Fremont as part of Project #6.



TECHNOLOGY SUPPORT



Gridscape Solutions* is a software and service company headquartered in Fremont that specializes in integrated smart grid software solutions. The City of Fremont and Gridscape Solutions have recently teamed to pursue a California Energy Commission (CEC) Electric Program Investment Charge (EPIC) opportunity. This state program funds technology demonstrations of reliably integrating energy-efficient demand-side resources, distributed clean energy generation and smart grid components to protect and enable energy-smart critical facilities. Gridscape will advise the Fremont team on potential means of recharging electric vehicles used in its Smart City applications, specifically, the automated, electric Project #1, and on-demand, electric mobility in Project #4.



Iteris*, located in the Bay Area (Berkeley), is an intelligent traffic management information company. Iteris also provides traffic detection solutions and sensors. Iteris will play a key role in designing a system to disseminate data collected by Fremont's Smart City applications, with particular focus on Project #2. Iteris can also provide sensors to detect pedestrians, bicyclists and people in wheelchairs to support safer traffic signal operation.



TransitScreen* is a San Francisco-based company that creates software to provide and display real-time transit information. This service is live and shows all the multi-modal transportation options at a specific location such as trains, buses and bicycle or car shares. Transit Screen will be tapped to design real-time information displays about the next train or bus and other available transportation options as part of Project #6.



RideScout* is a mobile app that provides real-time information about available transportation options, including transit, bus, bike, taxi, car share, rideshare, parking and walking in one view. RideScout will partner with the City in bringing their smart-phone app to Projects #4 and #6.



Silver Spring Networks*, located in the Bay Area (Redwood City), helps global utilities and cities connect, optimize and manage smart energy and smart city infrastructure. Silver Spring platforms are a highly promising candidate for implementation of a sensor-rich network as part of Project #2. Silver Spring may also advise the Fremont Smart City Challenge team on sensor and traffic control technologies.



Logicworks* is a private company that manages and solves the IT problems of enterprise corporations using cloud-based solutions. They are also providers of advanced traffic and parking sensors/devices. Logicworks is another promising candidate to provide sensor technology for Project #2. The Fremont team will also look to Logicworks as a source for sensor-based infrastructure on Project #5 to facilitate multimodal access and parking management, including a variable parking pricing system.

Visions of Fremont



(Source: Warm Springs/South Fremont Community Plan, approved July 2014)

“Fremont will serve as a national model of how an auto-oriented suburb can evolve into a sustainable, strategically urban, modern city.”

(Fremont General Plan Vision Statement, approved December 2011)

