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PUBLIC WORKS

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United States Department of Transportation
Smart City Challenge Grant Program
1200 New Jersey Ave., SE
Washington, DC 20590

February 4, 2016

Dear U.S. Department of Transportation Smart City Challenge Grant Program Staff:

The surface transportation system in the United States is a critical domestic asset which has helped lead to a period of unprecedented economic growth over the last half century. Today the health of that system is imperiled by ever expanding demands and insufficient resources for maintenance. As the U.S. DOT's report *Beyond Traffic* has articulated: America can no longer afford "business as usual" if we are to continue to depend on our surface transportation facilities to support our local, regional and national mobility needs.

In collaboration with our principal partner, the Sacramento Regional Transit District, and a team comprised of innovation and technology leaders, the City of Sacramento is very excited to submit our application for the U.S. DOT's Smart City Challenge Grant Program. Sacramento has been identified as "one of the most diverse cities in America." We are also one of a handful of cities receiving Promise Zone designation from HUD. We are proposing a project concept that will provide first mile/last mile service to our Light Rail system and link disadvantaged communities to education and employment opportunity through a combination of Autonomous Electric Vehicles and a "P3" with one or more Transportation Network Companies. Because of the diversity of Sacramento, and as the capitol of the 6th largest economy in the world, the vision we are proposing to be developed aligns perfectly with U.S. DOT goals, has applicability nationwide and has the potential for visibility globally.

Thank you for the opportunity to participate in this exciting program. As career transportation professionals and lifelong Sacramento residents, we've taken a personal interest in this project and we look forward to being part of its success.

Best Regards,


Jerry Way
Director of Public Works
City of Sacramento


Michael R. Wiley
General Manager/CEO
Sacramento Regional Transit District

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Appendix A: Letters of Commitment



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Question 1: Define your vision for your Smart City. Describe your city's challenges and how the proposed elements of this proposed project can be used to address those challenges. The vision should define your approach for implementing and operating the demonstration project, including your program management approach.

Sacramento Smart City Intelligent Transportation Project Vision Statement:

- ✓ Use next generation technologies to increase transportation choices, increase travel reliability, expand Light Rail service areas, reduce congestion, and lower the regional carbon footprint.
- ✓ Provide a ladder of opportunity by increasing transportation choices in disadvantaged communities.
- ✓ Show how these technologies and strategies are effective, and scalable for applications elsewhere in the United States.

Background and Problem Statement

As one of the few regions in California that can still boast of relatively affordable housing and robust employment growth, the Sacramento region, in partnership with the federal government, has invested heavily in the creation of a light rail system capable of providing an economical and convenient transportation option for residents of the greater metropolitan area. In similar fashion to the other 26 American cities with "true" light rail systems, Sacramento has struggled to increase light rail mode share, in major part, due to the "first mile/last mile" dilemma: while the light rail system provides an excellent regional transportation option, travelers who do not live and/or work close to a light rail station are significantly less likely to use the system (figure 1). Instead travelers are prone to use private automobiles for their work and recreational transportation needs.

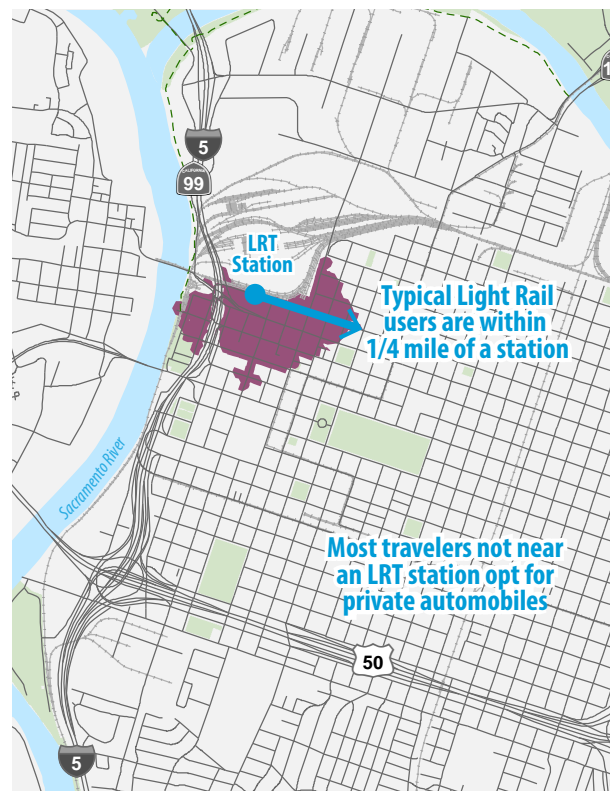


Figure 1

Challenge: Congested VMT and GHG Emissions

In the future, automotive users must compete for increasingly scant space on the regions' roadway network. Despite award-winning regional land use and transportation planning efforts, the City and region will suffer from increasing congestion. Congested VMT, which produces some of the highest levels of GHG emissions is projected to increase over time. Congested facilities will also reduce travel reliability. As illustrated in Figure 2, by 2036, the Sacramento Metropolitan Transportation Plan (MTP) predicts that the majority of the regions' arterials and mainline freeways will have significant segments on which the peak hour volume exceeds capacity. Fuel consumption by vehicles driven in Sacramento is the single largest source of GHG emissions in the City, accounting for approximately 48 percent of the City's total GHG emissions. Transportation is expected to contribute over 2 million metric tons of carbon dioxide equivalent annually by 2020.

Public transit, especially light rail, can play an essential role in improving reliability and accessibility to destinations while minimizing GHG and air pollutant emissions. The key is to find a way to expand the effective service area of LRT beyond the short 1/4-mile walk to and from the stations desired by most riders.

Challenge: An Underutilized Light Rail System

With 40 miles of track and 54 stations, Sacramento's LRT system offers a fantastic opportunity as a transportation alternative. Presently, within the SACRT Service Area, approximately 10% of the regional population is within reasonable walking distance of light rail. While the system experiences approximately 50,000 boardings per day currently (approximately 5% mode share), the average potential user's origin or destination is more than 1/4-mile from the existing stations. Enhancement of the first-mile/last-mile is key to increasing the utilization of the existing

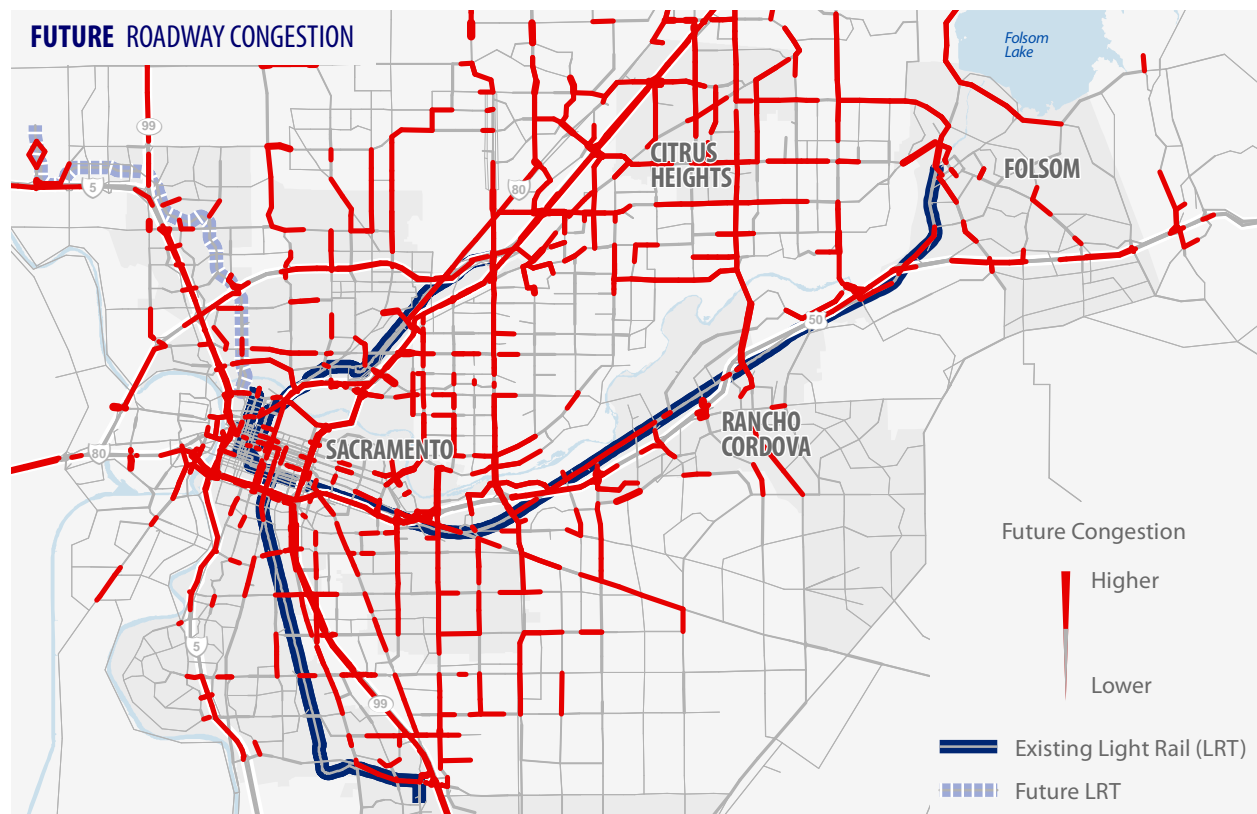


Figure 2

Sacramento's Underutilized Light Rail System

40 miles of track **54** stations

50,000 boardings per day

5% mode share

10% of the regional population is within reasonable walking distance of light rail.

Peak Hour LRT Vehicle Occupancy Range

57%-86%*

The average potential user's origin or destination is more than

1/4 - mile
from the existing stations.

* Sacramento Regional Transit District, 2013 Rail Fleet Management Plan

system. Coupled with longer-term infill development plans as described in the region's Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS), enhancing the ability to better-access the light rail system is integral to maintaining regional mobility and achieving the region's air quality conformity goals.

Challenge: Aging Infrastructure

Sacramento faces many of the same challenges most modern American Cities grapple with, including unfunded infrastructure maintenance burden. In the City, the backlog for pavement maintenance alone is \$150 million and growing. Almost without exception, at the City, County, and State, level,

Californians drive on deteriorating roadways with a perpetually growing maintenance backlog due to a structural transportation infrastructure funding deficit. Also, the City's traffic management infrastructure is largely based on 40+ year old technology with varying capabilities from one area to the next.

The City desires to address these issues by reducing VMT and the associated wear and tear on roadway. There is also a strong need to implement "smart" traffic control infrastructure which helps to reduce congestion, give priority to transit, and set the stage for vehicle to infrastructure technology.

Challenge: Address Transportation Needs in Disadvantaged Communities

Almost 50% of all households in the City of Sacramento have low incomes, earning 80 percent or less of area median income. Nearly 16% of City households have extremely low-incomes, earning less than 30% of area median income. The challenges faced by households with extremely low incomes are disproportionately felt among seniors (26%) and large families (30%). In 2015, a large portion of the City of Sacramento was designated as a federal Promise Zone (figure 3). For the population in the Promise Zone, the poverty and unemployment rates are 34.4% and 18.1%, respectively.

With the elimination of redevelopment agencies in California in 2012, there are few tools to help municipal government provide ladders of opportunity to their disadvantaged neighborhoods. The City of Sacramento wishes to augment the public transportation system so that it becomes a viable tool to reach out beyond the immediate vicinity of existing LRT stations to provide convenient service to jobs, education, and medical care for the communities that need it the most.



Project Introduction

In close collaboration with our partners, the City of Sacramento has envisioned a project that would meet the Smart City Challenge Goals of enhancing mobility and addressing climate change through the Sacramento Smart City Intelligent Transportation Project. This project proposes to address the first mile/last mile transit usership gap, as well as meeting special use needs through a combination of Autonomous Electric Transit Vehicles (AETV's), Partnerships with Transportation Network Companies (TNC's), and smart sensor based traffic management infrastructure.

Proposed Project:

The proposed project has four key elements:

1. Autonomous Electric Transit Vehicles
2. Partnership with one or more TNC's
3. Sacramento Smart City Transportation App
4. Smart Controllers

🔑 Key Element 1 - AETV

The City envisions a pilot phase, during which a fleet of AETV's would be deployed to selected LRT stations where they would charge on inductive charging units. AETV's would be owned and operated by SACRT. The stations equipped with AETV's would be carefully selected based on a service area which is most suitable for AETV operational support through fixed Vehicle to Infrastructure navigational/safety systems integrated into Smart Controllers (Smart Controllers are detailed below under "Key Element 4").

Autonomous vehicle manufacturers with whom the Sacramento team has been in contact have suggested that vehicles with the specifications the Sacramento Team is seeking may cost anywhere from \$150,000 to \$350,000 each. With 54 existing light rail stations, it

This Project Supports Sacramento's Expressed Promise Zone Goals:

- ✓ Create jobs
- ✓ Increase economic activity
- ✓ Improve educational opportunities
- ✓ Improve health and wellness
- ✓ Facilitate neighborhood revitalization

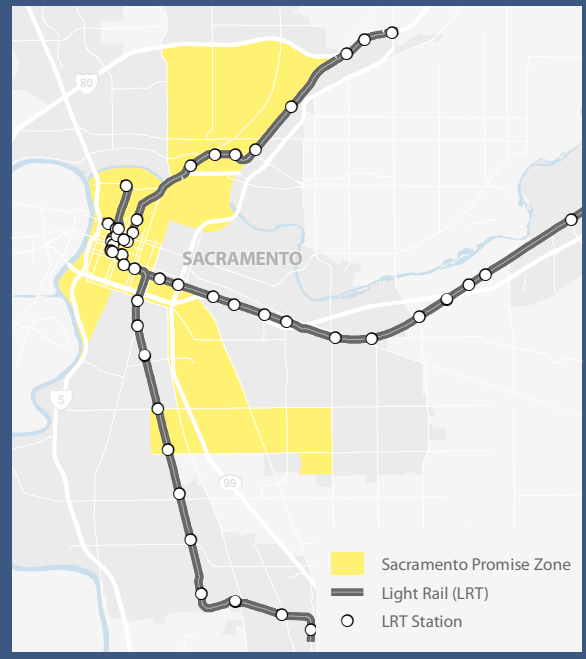


Figure 3

will not be financially feasible to equip every station with AETV's.

Financial considerations aside, initial AETV deployment to a small number of stations is preferable. Sacramento prefers to provide greater focus to a smaller fleet during the pilot phase. This focus will allow Sacramento to carefully monitor initial deployment to help ensure project success. Pilot phase support will include:

- A major public relations campaign which will not only advertise the availability of the expanded first mile/last mile service, but also to brand public transit as the preferred mode of transportation of the



Figure 4: Autonomous Electric Transit Vehicle

future. In essence, “build a buzz” around our new and improved 21st century public transit model.

- A ridership and performance measurement program conducted by University partners. (See response to Question 11)
- In line with current California DMV standards, AETV’s will operate with an attendant on-board. As autonomous vehicle standards mature and riders become more comfortable with the technology, Sacramento plans to remove attendants from the vehicles within 2 to 5 years as regulatory conditions allow.

As the name implies, the AETV’s will be fully electric, further driving GHG emission reduction. The project team includes the local electricity purveyor, the Sacramento Metropolitan Utility District (SMUD). SMUD became the only large California utility to meet the statewide goal of supplying 20% of its power from renewables in 2010 and is well on its way to meeting the 2020 goal of 37%. Hence, electric power from SMUD generates some of the lowest levels of GHGs in the country.

Sacramento appreciates the responsibility and the opportunity to be one of the first local agencies in America to deploy autonomous vehicle technology as part of its public transit inventory. The City has reflected this appreciation in our overall project vision statement: we will demonstrate that this

The UC Davis Institute of Transportation Studies (ITS-Davis) is a project partner. ITS-Davis hosts the National Center for Sustainable Transportation and has been actively involved in the research and development of electric, shared-ride, and autonomous vehicle technology for over 20 years. Not only do they bring this wealth of expertise to the project, they have also worked extensively with most of the major auto manufacturers on a variety of R&D topics, including autonomous, electric, and shared-ride technologies. These relationships provide direct access to the innovators at these companies with whom Sacramento can partner to bring these technologies into the mainstream and also help disseminate the technologies and lessons learned to other cities.

technology is a viable tool in our nation’s efforts to combat climate change and provide ladders of opportunity. Sacramento aims to ensure that its pilot AETV program achieves that goal.

🔑 Key Element 2 – TNC Partnerships

For light rail stations which are not initially equipped with AETV's, Sacramento will still provide first mile/last mile light rail service through a Public Private Partnership with a TNC. The model for this has already been proven to work in several U.S. Cities and is in the planning stages in several others. The difference in user experience between the AETV service and the TNC service would be negligible, as both services would be actuated by the Sacramento Smart City Transportation App, and both services would provide the same amenity.

There are several advantages to utilizing a dual provider first mile/last mile service model.

- TNC's ensure that the entire system, not just AETV pilot areas, will benefit from first/last mile service. This includes disadvantaged neighborhoods, where current transportation options are often limited by the lack of an automobile and/or inconvenient and/or circuitous bus service. This addresses not only a purely functional issue, but also an issue of equity, as the existing light rail stations favor those who can pragmatically reach them, i.e., automobile owners.
- TNC's offer a very flexible business model as they are typically deployed across a wide geographic area during most hours of the day. This allows overflow capacity for periods of high usage such as the commute hour or during AETV maintenance cycles. Without adding supplemental operations or labor costs, the first mile/last mile service can seamlessly accommodate fluctuations in user volume. This is particularly important in Sacramento where the downtown LRT

system serves the new Sacramento Kings Arena, Convention Center, and Community Center Theater.

- Growing and supporting the shared economy is widely accepted as a fundamentally important tool in addressing many of challenges we face as a nation and beyond in the future. By adding another facet in which people can be introduced to the shared economy, we move closer to our ultimate sustainability goals.
- TNC's are responsible for their own operations and maintenance costs, thereby reducing the burden on local government.
- Creates economic opportunity as new jobs are created for growing TNC's.
- Sacramento believes that autonomous vehicle technology will play an important role in our society's future one way or the other. However, if the regulatory environment, public perception, or other barriers prevent AETV's from being immediately successful, TNC service guarantee's that the first mile/last mile problem still gets solved.

TNC POLICY ELEMENTS SACRAMENTO WILL CONSIDER:

- Sacramento will evaluate a multiple provider system which would include "vouchers" for low income or disadvantaged community participants. Such a system would allow all TNC's to remain competitive on cost and quality of service.
- Sacramento may give preferential treatment to TNC's which can provide hybrid or electric vehicle service.

Key Element 3 – Sacramento Smart City Transportation App

One of the major factors that has allowed TNC's to thrive in the recent past is the revolutionary convenience with which they provide their service. With the mere touch of a button on a phone, almost anyone, almost anywhere can get timely and economical transportation at almost any time. On the other side of that coin, a common complaint with public transportation is the confusing and often non-intuitive process of route planning, as well as the inconvenience of fixed transit hubs. The City of Sacramento's proposed project would use the trail that has already been blazed by the TNC model to bring a new level of convenience to public transportation, and in doing so, begin to create new perceptions about public transit.

The City proposes to partner with one of the many private companies which have already developed on-line transportation planning applications to create a Sacramento specific app which will provide a "one-stop-shop" for transportation consumption. The app would allow users to specify their desired trip origin and destination to within a few blocks and pay for that trip in one quick transaction. That transaction would actuate first mile service from either an AETV or a TNC (depending on the user's location), deliver the user to a light rail station for a light rail trip ending at a destination light rail station where last mile transportation service is already waiting.

This element can be incorporated with relative ease due to the availability of similar existing services and applications. Also, the application development will be synergistic with the work that the local MPO, SACOG (Sacramento Area Council of Governments) has already done with the regional "Connect Card" program (see inset).

The Sacramento MPO, SACOG, has recently introduced the "Connect Card" Program to simplify transit fare payment



One Card to Ride Them All







Use Connect Card on eight transit systems across the region.

Working with an existing transportation App provider such as Ridescout, Metropia, or Transloc, Sacramento would integrate the Connect Card program into a comprehensive region wide on-line/ smart phone resource.

Key Element 4 – Smart Controllers

The final element of the City's proposal may be the piece that goes the farthest in laying groundwork for Sacramento's eventual transition into a true Smart City. The City proposes to deploy new Smart Controllers which would not only provide real time traffic management, but also supplement autonomous vehicle systems, and provide urban analytics.

How does it really work?

-  The user enters the desired origin and the desired destination of the trip they would like to take. The user then purchases the trip on-line.
-  First mile service is dispatched through either an AETV or a TNC.
-  User is transported to nearest LRT station. If first mile service is provided by an AETV, it follows a route on which it can stay connected to Smart Controllers. Depending on the route and time of day, the vehicle may benefit from transit system priority.
-  The user is delivered to the light rail station for the light rail leg of the journey.
-  The user arrives at the destination light rail station and boards either the AETV or the TNC vehicle for last mile service to the ultimate destination.
-  The user arrives at the final destination.

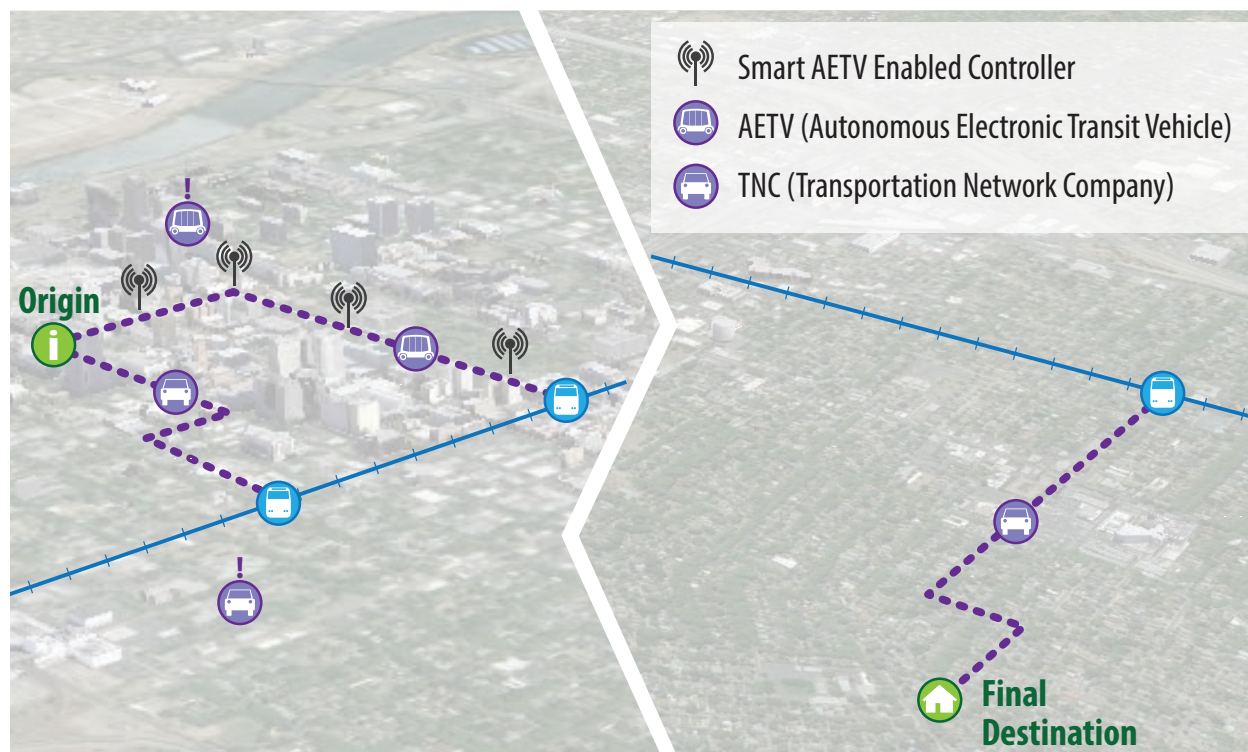


Figure 5

Returning to the theme of taking every available avenue to ensure the success of nascent autonomous vehicle technology, Smart Controllers would initially be deployed on traffic signals in the vicinity of AETV equipped light rail stations in such a way that a network of quasi-fixed routes is established. These quasi-fixed routes would be corridors that AETV's could travel on in such a way that AETV's are never out of Dedicated Short Range Communication (DSRC) range from a Smart Controller. In this way, the sensor based Smart Controllers act as a supplemental navigation system and an auxiliary safety feature in the event of a problem with AETV on-board autonomous navigation system.

In addition to the support for autonomous vehicle operation, Smart Controllers will also be designed to provide real time traffic management, transit system priority, and emergency vehicle pre-emption and communicate wirelessly with the City's existing Traffic Operations Center (TOC). The City also recognizes the value that the AETVs can offer as 'sensors' in the traffic stream. Travel conditions from these sensors can be communicated to the TOC

and the AETVs can also be equipped with cameras to provide 'mobile' real-time traffic views of operations, parking conditions, and traffic incidents.

AETV Special use Concepts:

In order to provide a wider range of opportunities to explore AETV use during the pilot phase, the City of Sacramento has identified several opportunities for "special uses" for AETV's, or uses other than first mile/last mile transit service. These possibilities will be explored in greater detail with our project partners if the City is fortunate enough to be invited by the U.S. DOT to submit a final Smart City Application during the next solicitation.

Special Event Shuttle

Service: Through a partnership with the National Basketball Association and the Sacramento Kings Professional Basketball team, the City is building a new sports and entertainment venue in downtown Sacramento: the Golden 1 Center. In order to be efficient with space in the largely built out central business district, the Golden 1 Center plan does not include construction of a new parking facility. Instead, the City has

worked extensively with dozens of businesses which own parking facilities to develop special event parking agreements. By coordinating the use of these private facilities and publicly owned facilities with a smartphone application, event goers are able to get directions to parking lots, get updates on which parking lots still have capacity, and even make reservations ahead of time for a parking spot. AETV's are envisioned to provide shuttle service to and from many of these parking facilities which are not located within convenient walking distance from the Center. AETV's may also be used to provide shuttle service to the Center staff parking lot, which is located several miles off site.

A similar arrangement is under evaluation for Sacramento's minor league professional soccer team the Republic FC.

Hospital Parking Shuttle

Service: Due to the existing high density development in the central business district, two major health care facilities have their campuses set apart from their parking facilities. The Sutter Health Care facility was completed in 2013 and the Kaiser Permanente facility is



currently in the entitlement phase. Both facilities could replace existing and/or planned parking shuttle service with AETV's.

Urban Delivery: One of the major areas of research focus for Sacramento Smart City team members in the UC Davis ITS group is urban delivery. Sacramento's central business district has significant need for urban delivery service due to the large number of retail and commercial businesses there that depend on logistics

for their livelihood. Its manageable size makes it the perfect test bed for an urban delivery pilot. The City will be working with our UC Davis ITS partners to evaluate the feasibility of an urban delivery pilot program during phase 2 of the Smart City application process.

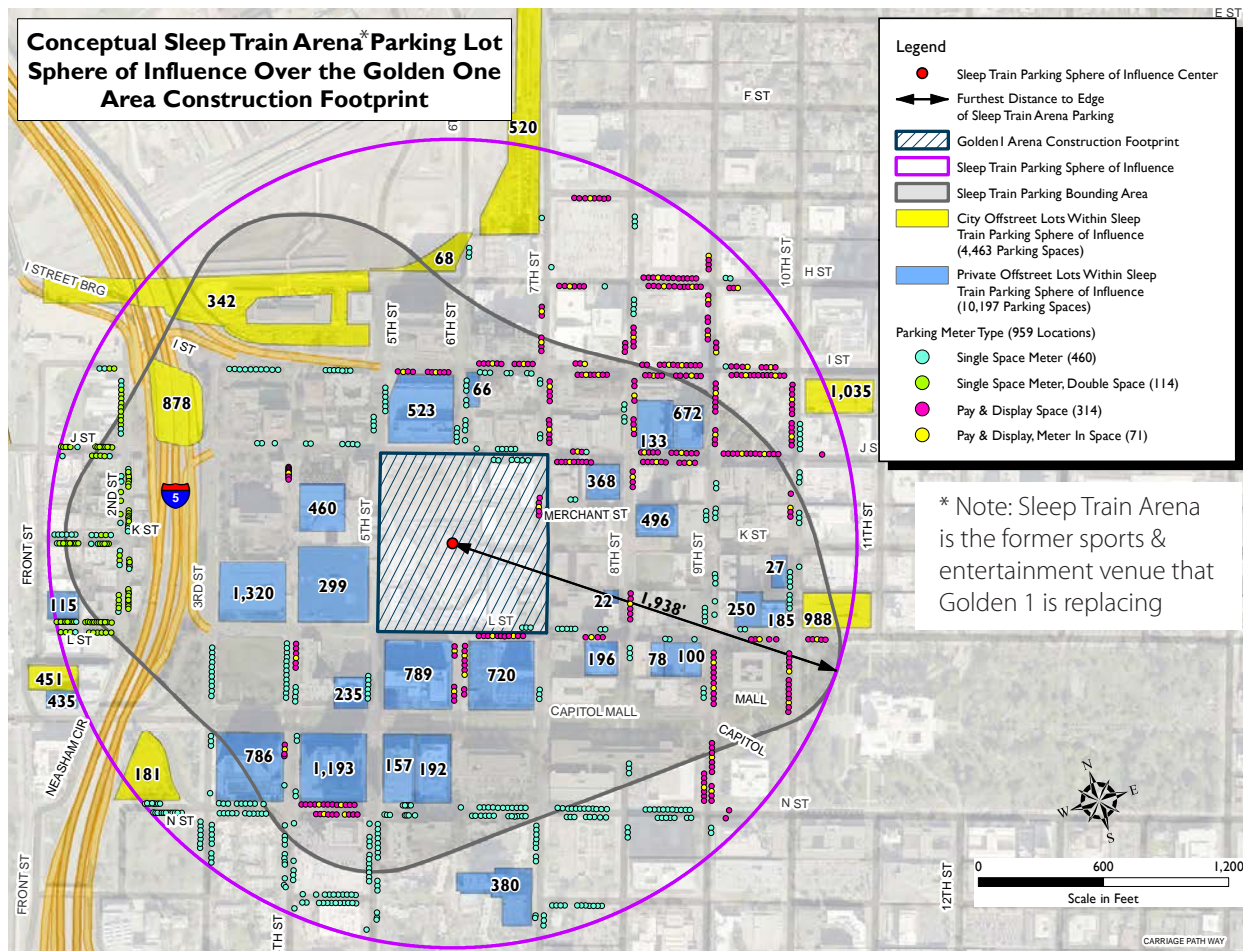


Figure 6

2

Question 2: Describe the population characteristics of your city and show how it aligns with the USDOT’s characteristics for a Smart City, including:

Question 2a:

City of Sacramento had a total population of 466,488 within its city limits during the 2010 census.

Question 2b:

Density within the city limits is 4,665 inhabitants per square mile. Density within the regional urbanized area it is 3,621 inhabitants per square mile.

Question 2c:

The population within the city limits represents 27.1% of the population within the regional urbanized area (population 1,723,634).

3

Question 3: Describe other characteristics of your city and show how it aligns with the USDOT’s characteristics for a Smart City, including:

Question 3a: Existing public transportation system

Sacramento Regional Transit District (SACRT) is the primary public transportation system in the City of Sacramento, and the largest of the eight public transit agencies in the region. Established in 1973, SACRT operates over 60 bus routes which provide coverage for well over 400 square miles. SACRT also operates the 14th busiest light rail system in America in terms of ridership with 14 million riders annually. With over 40 miles of existing track and 54 stations, Sacramento’s light rail system provides the backbone of the region’s public transportation system.

Question 3b: Environment that is conducive to demonstrating proposed strategies

The proposed strategies are intended to complement the existing built environment in Sacramento, which already has a robust LRT system and a commitment to long-term (and award winning) smart growth strategies. The complementary aspect of the proposed strategies will increase accessibility to destinations for tens of thousands of people through cost-effective public and private travel options that will minimize air pollutants and GHG emissions. Many of



these people reside in Sacramento's Promise Zone and are not able to fully engage in the local and regional economy because of their limited and high cost travel options.

Examples of past success are listed below.

- Sacramento displayed foresight and commitment to implement a light rail system in the first place.
- Sacramento has successfully raised \$110 million towards a streetcar project.
- The Sacramento region has created and implemented the award-winning SACOG Blueprint, and in doing so, become a national model for smart growth transportation and land use planning (See figure 7).
- The Sacramento Region provided the vision and led the way for the passage and implementation of California's SB 375, which establishes GHG reduction targets for every metropolitan region in California.
- Sacramento has adopted a general plan in compliance with SB 375 along with a Climate Action Plan to ensure the City maximizes the potential to reduced GHGs.
- Rather than approach implementation of the \$200 million in downtown transportation improvements in the MTP in a piecemeal fashion, Sacramento has initiated its "Grid 2.0" project, to plan for them all comprehensively. Through this effort, the City is exploring innovative new ideas in the use of our downtown transportation network (www.sacgrid.com).

RELEVANT STATE LEGISLATION:

Assembly Bill (AB) 32: 2007 Bill mandating the development of regulations and market mechanisms to reduce California's GHG emissions to 1990 levels by 2020.

Senate Bill (SB) 375: Landmark 2008 law mandating that every metropolitan area in California establish target GHG emission reduction targets as part of its Metropolitan Transportation Plan.

SB 743: 2013 bill replaces vehicle level of service (LOS) with vehicle miles of travel (VMT) as the predominant metric for identifying transportation impacts. The conventional use of vehicle LOS failed to demonstrate the benefits of urban infill and mixed-use development. Further, LOS mitigation focused on expanding the roadway network, which only exacerbated current deficits for operations and maintenance.

- SACOG is launching a joint Intelligent Transportation System Master Plan and ITS Architecture update for the City of Sacramento and the region in 2016.
- Sacramento is home to Caltrans Headquarters, the California Air Resources Board (CARB), SACOG, University of California at Davis (UCD), and California State University at Sacramento (CSUS). The synergy between these public agencies and academic institutions allows for a wide range of idea sharing. This sharing contributes to unique outcomes not commonly found in other cities.

Question 3c: Continuity of committed leadership and capacity to carry out the demonstration throughout the period of performance

For the purpose of the Smart City Challenge, the Sacramento Team defines “leadership” as the ability to push for innovative problem solving and nimble execution when faced with new challenges. For decades, the State of California has shown extraordinary leadership in its approach to a variety of issues, not least of which is action on climate change and water conservation.

Similarly, the City and region of Sacramento have shown great courage, foresight, and leadership in the implementation of several important initiatives. For all of these, elected officials, regional planners, and transportation & transit officials have shown their ability to form a coalition and get big things done. This commitment is as strong as ever for the Smart City Challenge proposal, which is endorsed by the Mayor and City Council of Sacramento, the Sacramento Area Council of Governments, the Sacramento Regional Transit District, and Caltrans. Some relevant examples of committed leadership are as follows:

- Sacramento agencies have shown continual land use, transportation, and environmental leadership demonstrated by creation of SACOG Blueprint and subsequent statewide legislation.
 - The success of the Blueprint led to statewide legislation such as California SB 375 that established GHG reduction targets for all metropolitan planning organizations (MPOs).
 - SB 743 passed in 2013 replaces vehicle level of service (LOS) with vehicle miles of travel (VMT), easing regulatory barriers to in-fill smart growth projects.
 - The City of Sacramento exempted its entire downtown from vehicle LOS requirements in 2005, streamlining the process for smart growth projects.
- The region has a strong local commitment to transit as evidenced by the historical and planned transit

GROWTH NEAR TRANSIT
Within walking distance of 15-minute or better transit service



Figure 7

allocations from Measure A, the local Sacramento County sales tax dedicated to transportation projects. This tax was first approved by voters in 1989 and was recently extended for another 30 years in 2009.

- The region’s commitment to leadership and local identity was recently evidenced by the effort to keep the NBA’s Sacramento Kings located in Sacramento after several attempts by other Cities to move the team. The City, in partnership with the Kings organization and other regional partners, is building a downtown Arena directly on the LRT system and integrating mixed-use development directly into the project site to create a more robust 24-hour downtown environment.

Question 3d: A commitment to integrating with the sharing economy

Sacramento recognizes the benefit of the sharing economy and the ability for greater asset utilization. The City recognized its role early in setting expectations as well as legal and regulatory frameworks to facilitate successful implementation of new services as outlined below.

- Close coordination with TNC's is a fundamental component of our proposal. Sacramento has long supported the operation of UBER and Lyft in the community.
- The City recently created local ordinances which codify the legality and acceptance of both TNC's and Airbnb, despite opposition from local private transportation providers and the local hotel industry.
- Sacramento recently initiated a Bikeshare program that plans to open in 2017 with almost 90 stations and over 600 bikes.

- Sacramento has been a host City for Zipcar since 2001.
- Sacramento is actively seeking grant funding to implement an electric car share program in collaboration with our private sector partner Car2Go (www.car2go.com)

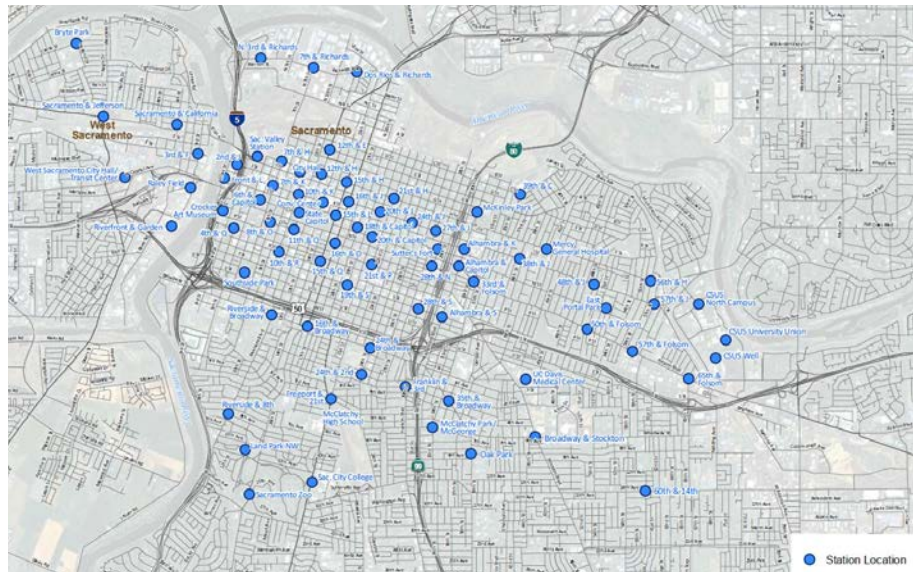


Figure 8: Candidate Bike Share Locations in Sacramento and West Sacramento

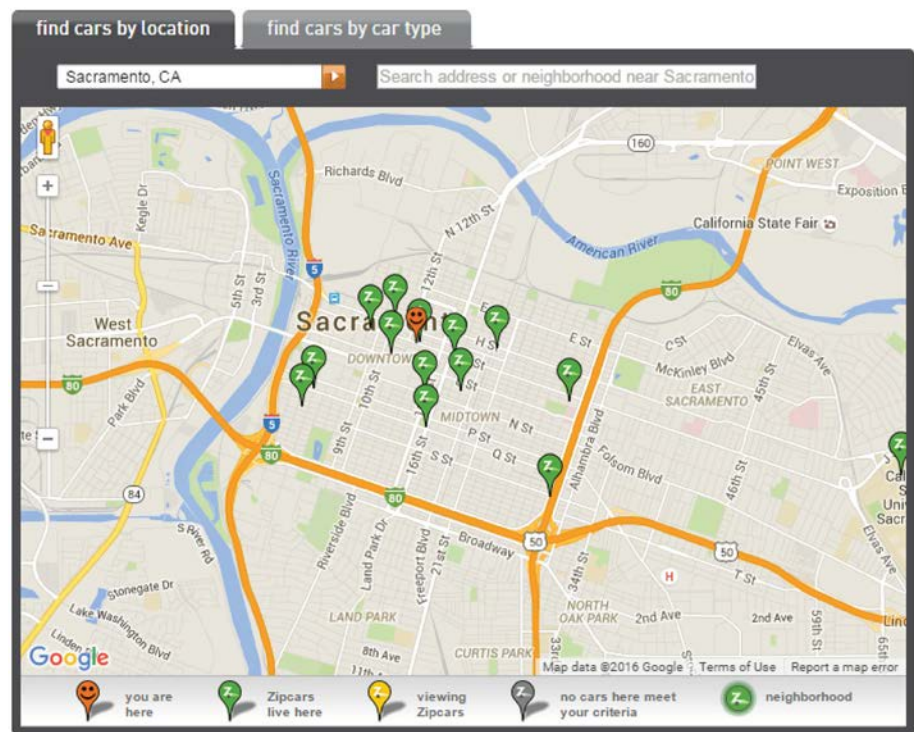


Figure 9: ZipCar in Sacramento

Question 3e: A clear commitment to making open, machine-readable data accessible, discoverable and usable by the public to fuel entrepreneurship and innovation.

The City of Sacramento’s commitment to open data is best demonstrated through its open data platform and portal, which allows users access to a substantial amount of data related to the physical aspects of the City as well as how it functions as a government agency.

The City’s open data portal already includes traffic count and collision records, and the City has ensured that API access is available to improve the ease of use by others.

The City has a strong Public Records Act policy, which mandates disclosure of any public domain materials within 24 hours, free of charge.

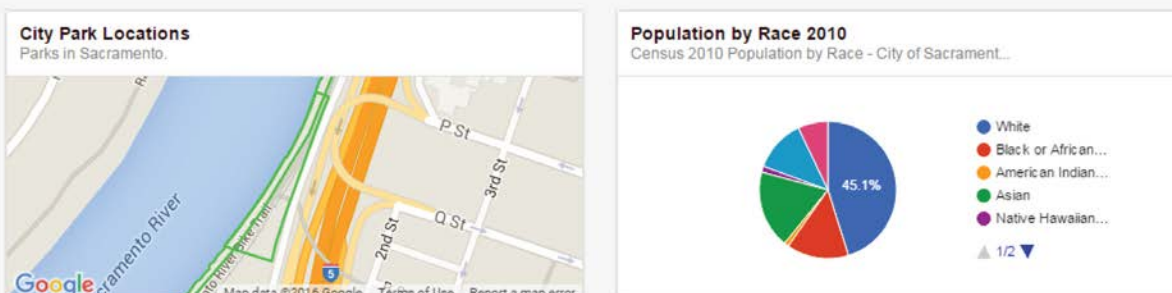
This proposal will build on our open data platform through the City’s new state of the art Smart Controllers and use of the AETVs as mobile data sensors. Instead of relying on manual traffic counts, future traffic studies will simply download data collected through the controllers and sensors. Data will be organized, mapped, and stored for access through the City’s open data portal. The City does not charge for data or require registration on the site to obtain data. This information is available to anyone, anytime.

City of Sacramento Open Data Portal

Welcome to City of Sacramento open data portal. Our mission is to promote the openness, transparency and accountability of city government by providing high-value government data. This site is dedicated to providing citizens with access and insight into the city's information in standards compliant, machine readable and an easy to use format. This will serve as the basis for the creation of useful civic applications by third party developers.

We encourage you to navigate through the data catalog, download datasets, and share data through social networks. You can also easily embed data on your own website and access data via [RESTful API](#) to build your own applications. We will continue to expand our data catalog and offerings. Check the site often for new data sets

City legislative history and other important documents are now available online. Visit our [online record library](#) to begin your search.



For City of Sacramento Open Data Policy and related documents, [click here](#). If you wish to request a data set, [click here](#).

Figure 10: City of Sacramento Open Data Portal



4

Question 4: Provide an Annotated Preliminary Site Map.

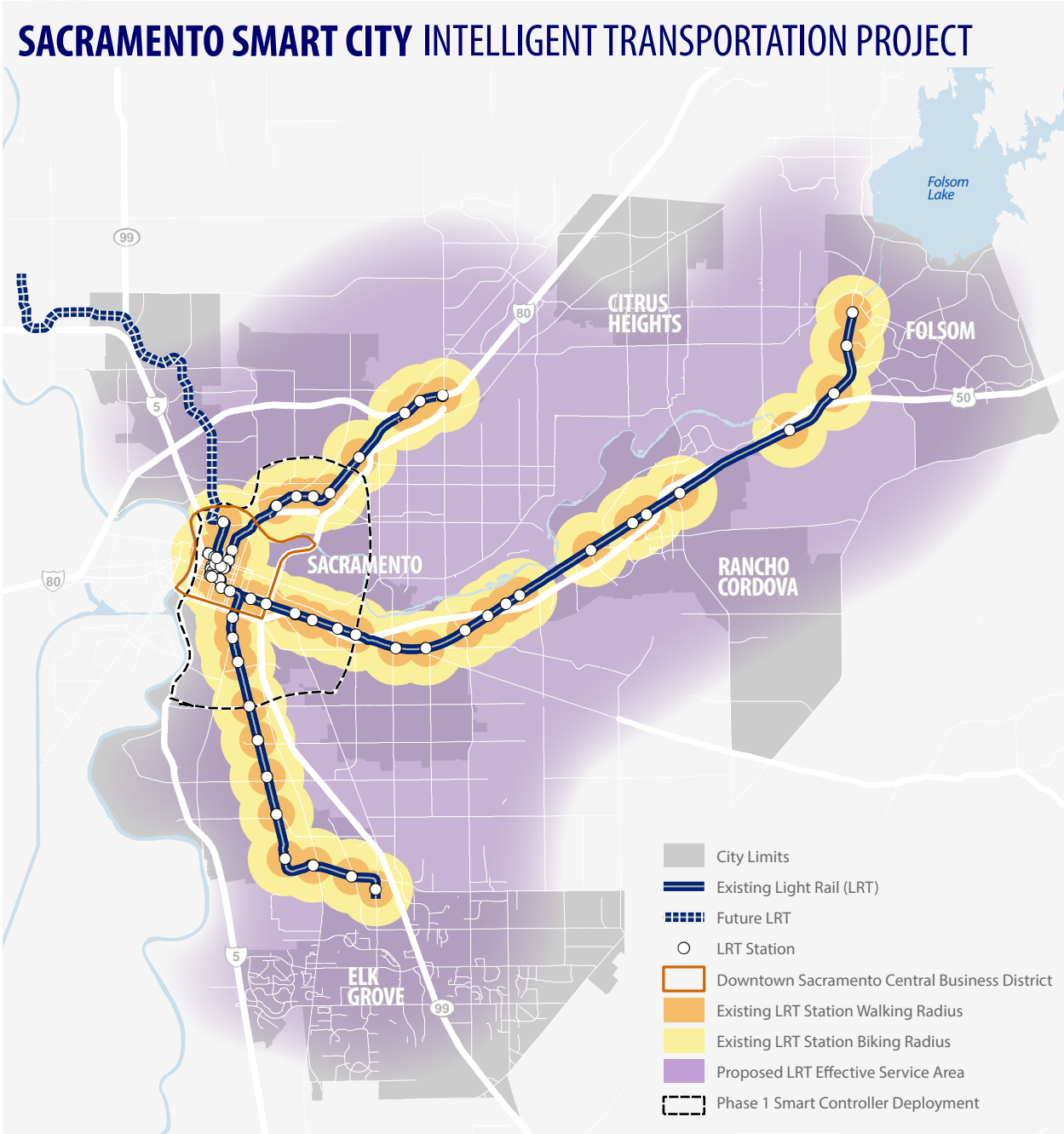


Figure 11

5

Question 5 (part 1); Describe how your holistic, integrated approach aligns to the twelve USDOT vision elements described in this solicitation. For each vision element, describe your approach including the technology solutions proposed.

Vision Element: Urban Automation

Approach: The City of Sacramento/SACRT proposes to implement an autonomous transit vehicle to provide first mile/last mile LRT service.

Vision Element: Connected Vehicles

Approach: AETV's will communicate with Smart Controllers and are also proposed to serve as shuttle service providers during special events in the downtown core. Sacramento's proposal includes vehicle to vehicle networking so that the vehicles can act as small "trains" when user demand requires it.

Vision Element: Intelligent Infrastructure

Approach: This project will include Smart Controllers which provide automated real time

intersection traffic management, transit system priority, emergency vehicle pre-emption, and wireless interconnect, integrated with autonomous vehicle safety and navigation capabilities on a platform which is easily upgradeable. After the initial investment in deployment and support of AETV's as part of this project, the City and region will continue to invest in Smart Controllers as part of its standard infrastructure.

Vision Element: Urban Analytics

Approach: Ease of implementing a robust urban analytics system is one of the many great benefits to the Sacramento proposal. The Smart Controllers which will be deployed through this project will continuously collect traffic data and wirelessly transmit it back to a database in the City's Traffic Operations Center. Additional data can be harvested by the AETV's themselves as they operate on the City's roadway network. The Sacramento Team also envisions utilizing the Smart City Transportation App to gather data. As part of the public relations program, the Sacramento team is also considering soliciting voluntary region-wide participation from transit users and non-users alike in an app based mobility "share your data" program which would track travel patterns of participants. While there are many uses for the mobility data gathered through these means, the primary project related goal is to be able to refine the first mile/last mile service over time.

CALTRANS' ROAD CHARGE PILOT PROGRAM:

The state of California has recently initiated a pilot program which will attempt to test a system of charging road users based on VMT, in order to ultimately replace the antiquated gas tax system which has left much of the nation's roadways without sufficient maintenance funding. Sacramento is reaching out to Caltrans to look for opportunities to use analytic technology to aid in this effort.



SACRAMENTO SMART CITY INTELLIGENT TRANSPORTATION PROJECT PARTNERS:

Private Sector:

- Sacramento Kings
- Sacramento Republic FC Soccer Team
- Downtown Sacramento Partnership (Business Association)
- Kaiser Permanente
- Sutter Health
- UBER
- AT&T
- Google X
- Cisco Systems
- Transloc
- Easy Mile Autonomous Vehicle

Academia:

- UC Davis Institute for Transportation Studies
- California State University, Sacramento
- UC Berkley PATH

Public Sector:

- Sacramento Regional Transit
- Sacramento Municipal Utility District
- Sacramento Area Council of Governments
- Caltrans
- Sacramento Housing & Redevelopment Agency
- CCTA/GoMentum Station AV testbed

Non-Profit:

- 1776
- Transportation for America

Vision Element: User Focused Mobility Services & Choices

Approach: Providing user focused mobility services & choices is really what the City of Sacramento's proposed project is all about. The initiation of a first mile/last mile service in support of light rail will ultimately provide transportation options for many thousands of area residents who either don't own cars now or would prefer not to in the future. The Sacramento Smart City Transportation App will allow users to easily plan for and purchase their trips without requiring extensive knowledge of the location of transit stops, transfer stations, and timetables. In essence, the Sacramento team has envisioned a project which truly acts as a springboard to bring the entire Sacramento region into the new shared economy.

Vision Element: Urban Delivery & Logistics

Approach: As has been discussed previously under "AETV Special Uses", the City of Sacramento and the UC Davis ITS research group are collaborating on the evaluation of an urban delivery pilot program for the Sacramento Central Business District. This program would use AETV's to provide logistics support for business in the downtown who utilize or plan to utilize just-in-time-delivery for inventory management, as well as other businesses who desire to explore this new paradigm.

Vision Element: Strategic Business Models & Partnering

Approach: The City of Sacramento has spent extensive time reaching out to potential partners as part of our effort to define the proposed project. The City feels that the

breadth and depth of the team that is forming around this effort is indicative of the regional excitement and commitment to making Sacramento a Smart City. As has been discussed elsewhere in this proposal, the Sacramento Team plans to work with one or more TNCs in a public private partnership to expand first mile/last mile transit service beyond just the selected light rail stations which will initially be equipped with AETV units. The model has the advantage of not only providing a catalytic effect on transit that the City and region desires, but also, it provides a private sector business opportunity. See question 7 for specific team member roles.

Vision Element: Smart Grid, Electrification, & Electric Vehicles

Approach: As has been discussed elsewhere in this application, the Sacramento proposal includes autonomous electric vehicles, as well as inductive charging stations located at light rail stations.

Vision Element: Connected Involved Citizens

Approach: The Sacramento Team is proposing an exciting and innovative new approach to expand transit service. In order to help ensure its success, Sacramento proposes to launch a major public relations effort as one of the first steps in implementation. The City's vision is to re-brand transit as an exciting part of the new shared economy and a way all citizens can help to limit GHG emissions and combat climate change. The Sacramento Smart City Transportation App will allow citizens to stay up to date by the minute with transportation options in their area, including traffic updates and real time tracking of transit vehicles. As part of the AETV roll-out, the City will also use social media and on-line surveys to solicit public crowdsourcing feedback on

stations where AETV's should be located and in which areas citizens would like to see them operate.

Vision Element: Architecture & Standards

Approach: The desire to use the Sacramento Smart City Intelligent Transportation Project as a pilot whose elements are reproducible in other jurisdictions throughout the United States is reflected in the Sacramento Smart City Vision Statement, and has been at the core of the Sacramento Teams' thinking from the beginning. Throughout the proposed project, the Sacramento Team will adhere to CVRIA standards and National ITS Architecture in order to ensure that the project is scalable. As was discussed previously under "Key Element 4 –Smart Controllers", Sacramento envisions controllers which are easily maintained, repaired, and upgradeable, making them attractive for other markets. A unique advantage that the Sacramento Team offers is the deployment of an autonomous vehicle program which literally runs on the street in front of the State Capitol. This offers an opportunity to allow lawmakers to see the program first hand, experience the vehicles and thereby become more comfortable with the technology. Sacramento is confident that this "hands-on" opportunity, coupled with legislative advocacy, will act as a catalyst for more progressive and technology friendly standards for autonomous vehicles in California.

Vision Element: Low Cost, Efficient, Secure, Information & Communication Technology

Approach: The aim of the Sacramento project is to provide an efficient, low cost, and secure platform for Smart Controllers.



Smart Controllers utilize DSRC technology already, which is, by design, a secure methodology. Sacramento will work with the USDOT to incorporate the security credential management system (SCMS) that is currently under development.

Vision Element: Smart Land Use

Approach: Implementation of the proposed project will vastly increase the land area which is available for transit oriented development. With the increased distance from LRT stations that becomes accessible through this project, dense, in-fill, resource efficient land development need not only take place within a relatively small radius around light rail stations.

Question 5 (part 2): Illustrate how the proposed technology solutions can synergistically combine to create measurable impact while reducing costs associated with both deployment and operations

The Sacramento proposal includes several innovative concepts which are almost certain to become the state of the practice in the foreseeable future, if not already.

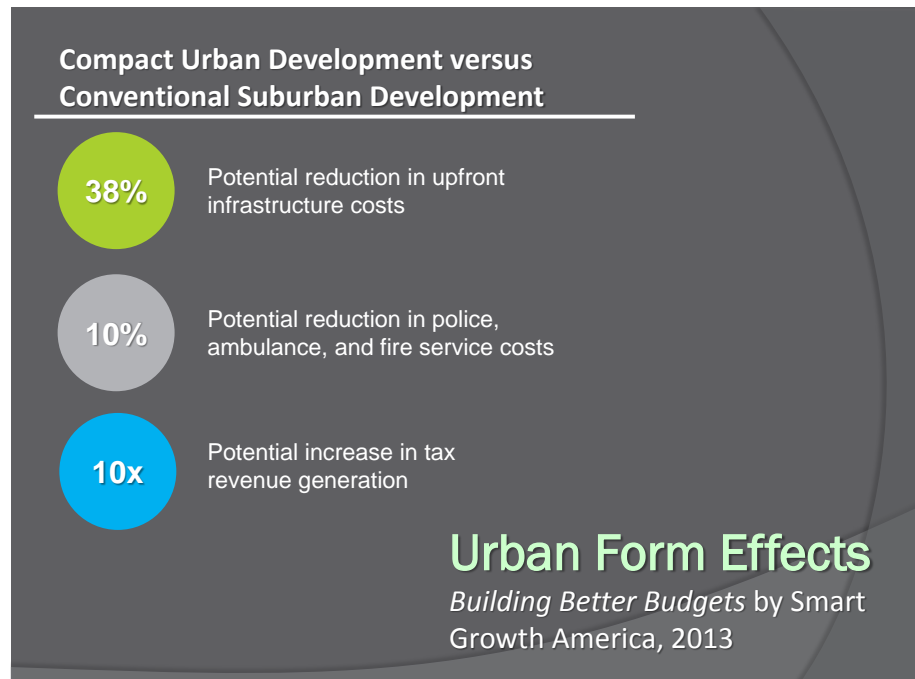


Figure 12



Figure 13

Transportation planning apps have been prevalent for several years now. Ride sharing, connected vehicles, and autonomous vehicles are already being deployed in many locations around the U.S. Smart controllers which manage traffic in real time and also communicate with vehicles are deployed in experimental applications in many locations around the nation. **The synergy that the Sacramento proposal creates is in combining all of these new technologies to work together to show how they can combine to make a truly smart transportation system.**

- The project will operate in the capitol which makes Sacramento uniquely positioned to demonstrate the projects' benefits, allows lawmakers to use the system, and inform the nascent regulatory dialogue about autonomous vehicle standards.
- The project will allow the public to overcome fears about autonomous vehicles by introducing vehicles with on-board autonomous navigation systems, a human attendant, and stationary navigation systems in Smart Controllers. This three way safety net will encourage use by existing transit users, new transit users, and transit skeptics who are excited about autonomous technology. The synergy of removing fears, gaining political acceptance, and extending the effective transit service will result in a measurable increase in accessibility for many travelers along with a noticeable increase in transit mode share.
- By folding TNC service into the menu of options for areas not served by AETV's, much of the operations and maintenance costs for vehicles and labor are borne by private TNC's.

THE ECONOMIC CASE FOR INCREASING TRANSIT MODE SHARE

The average vehicle trip length for the City of Sacramento according to the California Household Travel Survey is approximately 7 miles. For every vehicle trip that shifts to transit because of this proposal, the City will be avoiding approximately 7 pounds of CO2 equivalent GHG emissions.

According to APTA (<http://www.apta.com/mediacenter/ptbenefits/Pages/default.aspx>),

- Every \$1 invested in public transportation generates approximately \$4 in economic returns.
- Every \$10 million in capital investment in public transportation yields \$30 million in increased business sales.
- Home values performed 42 percent better on average if they were located near public transportation with high-frequency service.

These estimates are based on traditional transit services. The City of Sacramento is offering an enhanced and more convenient service that will add a multiplier effect to these values.



6

Question 6: Identify and rate key technical, policy, and institutional risks associated with the deployment vision and discuss plans for mitigating those risks.

Risk: O&M costs

Mitigation: First/last mile service can offset some lower performing conventional bus service. Also, use of TNC's in non-AETV areas will let the TNC's be responsible for their own O&M costs.

Risk: Transit labor unions may resist "driverless" technology

Mitigation: The labor pool no longer needed for conventional busses can be utilized on AETV's and supporting core LRT service.

Risk: Public acceptance

Mitigation: Three tiered safety net (on-board navigation, on-board attendant, stationary roadside navigation). Also, create a public relation / education campaign to generate a buzz.

Risk: Problems getting California regulations to catch up to autonomous vehicle technology

Mitigation: Use our geographical location as an advantage for demonstration of technology as well as lobbying and political advocacy.

Risk: Overcoming public sentiment about more capital improvements instead of addressing "fix it first" commitments.

Mitigation: "Smart" infrastructure could be the very thing that finally saves us from the never ending downward spiral of unfindable maintenance obligations because the focus isn't to keep building more asphalt. Rather, the focus is to use existing asphalt more efficiently. Also, increased ridership helps support greater efficiency/cost-effectiveness in the transit system and greater support for a state of good repair.

U.S. keeps building new highways while letting old ones crumble

McClatchy Newspapers (Curtis Tate and Greg Gordon)
Posted: 02/03/2013 9:54 AM

In California, transportation officials estimate that 60 percent of the state's roads and a quarter of its bridges need to be repaired or replaced, at a projected cost of \$70 billion over a decade, some \$52 billion more than the available funds.

Figure 14



Question 7: Outline team partners, key stakeholders, and demonstration governance processes. Describe existing and future public and/or private partnerships, including university research partnerships.

Partnerships will be fundamental to project success. Sacramento will implement the project through leadership provided by a steering committee with four primary sub-committees.

| | Steering Committee Sub-committee | AETV Deployment Sub-committee | TMC Partnership Sub-committee | Smartphone App Sub-committee | Smart Controller Sub-committee |
|--------------------|----------------------------------|-------------------------------|-------------------------------|------------------------------|--------------------------------|
| City of Sacramento | ✓ | ✓ | ✓ | ✓ | ✓ |
| SACRT | ✓ | ✓ | ✓ | ✓ | ✓ |
| SACOG | ✓ | ✓ | ✓ | ✓ | ✓ |
| Caltrans | ✓ | ✓ | | | ✓ |
| Google X | | ✓ | | ✓ | ✓ |
| AT&T | | | | | ✓ |
| Cisco | | | | | ✓ |
| UC Davis | ✓ | ✓ | ✓ | ✓ | ✓ |
| CSU Sacramento | ✓ | | ✓ | ✓ | |
| UC Berkley PATH | | ✓ | | | ✓ |
| SMUD | | ✓ | | | |
| 1776/T4A | ✓ | | | | |
| GoMentum | | ✓ | | | ✓ |
| Transloc | | | ✓ | ✓ | ✓ |
| Uber | | | ✓ | ✓ | |

The Steering Committee will be led by a project manager from the City of Sacramento and will determine governing project policy. This will include not only coordinating and determining work plans for the four main sub-committees, but also coordinating AETV special use policy and a strategy for a public relations campaign.

Additional important stakeholders include the Sacramento Kings, the Republic FC semi-pro Soccer Team, The Downtown Sacramento Partnership (Business Association), the Sacramento Chamber of Commerce, Kaiser Permanente Hospital, and Sutter Health Care.



8

Question 8: Describe existing transportation infrastructure and system features in your city, including:

Question 8a: Arterial miles

10,863 (lane miles)

Question 8b: Freeway miles

1,622 (lane miles)

Question 8c: Transit services

See response to question “3a” on page 11.

Question 8d: Shared-use mobility services

See response to question “3d” on page 14. The City has business franchises for ZipCar, Lyft, and Uber, and is developing a bikeshare program in partnership with SACOG and other jurisdictions.

Question 8e: Information and communication technology (ICT)

Sacramento has recently conducted its “5-Bar” study to assess the feasibility of providing City-wide Wi-Fi service. Expanding access to city services to anyone, anytime, anywhere (responsive, accessible, and mobile) is a primary mission of the City’s Digital Strategy. In addition to existing TOC facilities (see Question 8f); the City also has 150 miles of conduit, two data centers, and over 100 miles of fiber optic cable. The cost of investment in small cells, ODAS, and Wi-Fi are very low right now while construction of the Golden 1 Center is underway and the City is poised to launch a new generation of communications technology.

Question 8f: Intelligent Transportation Systems (ITS) including transportation management centers and field equipment

The City has worked hard on the implementation of Traffic operation Center (TOC), traffic communication network and an Advance Traffic Management System (ATMS) for Central Traffic Control to optimizing the existing roadway system, manually change timing, and manage incidents.

The Traffic Operations Center is located in City Hall and utilizes Transcore, a computer-based ATMS traffic signal control system which monitors traffic conditions and system performance. The TOC also uses closed-circuit television (CCTV) surveillance equipment deployed at critical locations throughout the City to monitor traffic conditions. The City has installed CCTV cameras at 98 locations and new sites are being added. The City operates over 780 signalized intersections of which 430 are currently connected to central traffic control system.



Figure 15: City of Sacramento Traffic Control Center

Question 8g: Smart Grid infrastructure including electric vehicle charging infrastructure

The City currently has 48 public charging stations located at City owned parking structures. Additionally, there are 3 sites in the City which are used to charge electric vehicles in the City's fleet.



Figure 16: City of Sacramento Electric Vehicle Parking

9

Question 9 (part 1): Define the data your city currently collects. Describe how these data, along with new data to be collected and shared during the demonstration may be used by the lead agency, project partners, other agencies and stakeholders to further address city challenges.

In addition to the information presented previously; the City and our partners collect a wide range of existing transportation network and use data across all modes with routine sharing through websites and our open data portal. Sacramento also partners with private firms that use 'big data' to help understand travel patterns as part of transportation planning and impact analysis. For example, The City used cell phone and mobile device data to estimate arrival and departure patterns for Sacramento Kings and Republic FC games as part of analyzing new arena locations. This experience with mobile device data has helped define this proposal such that Sacramento recognizes that smart phones and AETV's are mobile sensors that can provide data to help refine future service.

Question 9 (part 2): Describe how transportation data could integrate with other functions or services in a city (such as public safety, human services, transit, and public works) to improve the management and operations of the city.

Traffic data collected through the systems described in this proposal could be used for a variety of purposes. Both publicly funded capital improvement projects as well as private development projects require time consuming and resource intensive traffic studies as part of their environmental clearance. Data collected through the proposed project could eliminate the need for these studies and greatly reduce the costs and schedule impacts associated with the regulatory process.



The City of Sacramento and Sacramento County co-operate a regional Emergency Operations Center (EOC) which maintains a state of readiness in the event of a major regional emergency such as a flood, major hazardous material spill, terror attack, etc. The type of information gathering network envisioned with the next generation Smart Controllers would be invaluable for decision makers operating at the EOC during a regional emergency.

It may be possible to utilize the elements described in this proposal in law enforcement applications including incident management. However, such applications will need to be carefully vetted against privacy policies.

The information gathered as part of this project, in conjunction with crowdsourcing feedback, will be useful in optimizing transit routes and timetables.

Question 9 (part 3): Likewise, describe how other data could be integrated with transportation data to improve transportation operations.

AETVs can be equipped with cameras that can provide mobile probes of traffic operating conditions, which can contribute to incident and parking management as well as law enforcement activities.

Question 9 (part 4): Describe any existing policies and identify their sources (local executive order or policy, local ordinance or state legislation, etc.) applicable to the proposed data to be collected and shared as part of the proposed project.

VMT measurement and monitoring are required at the State, regional, and local level in California due to laws such as AB 32, SB 375, and SB 743. Understanding how the proposed service changes VMT could result in this new service being qualified as a mitigation action that new development could contribute towards through the California Environmental Quality Act (CEQA). The proposal includes the ability to use sensors and user's smart phone app data to capture VMT effects.

Question 9 (part 5): Submissions describing cross-cutting partnerships to advance smart city technologies, related programs and policies are encouraged, but not required. If you plan to partner with outside organizations (nonprofits, universities, corporations, etc.) you should address whether and specify how (e.g., limitation on sharing or use) data from those organizations or interests will be collected, managed, and shared across sectors or with the public, if appropriate

The City's goal of developing a model to address first mile/last mile transit issues is reflected in the project Vision Statement. Sacramento already has a very strong citywide policy on dissemination of public records in accordance with the Public Records Act. Any non-proprietary, non-confidential material produced or paid for by the City is made available to anyone who files a Public Records Act Request within 24 hours. The City already makes on-line records of all traffic counts in its possession.

The project will work with one of our academic partners to produce an annual monitoring report through the pilot phase of the project, and possibly beyond, depending on availability of funding. The report will be made available to the public through the City's website.

Question 9 (part 6): Identify candidate data that is expected to be shared, used, and used for other purposes by the participating project partners or with the public.

The City of Sacramento has a strong culture of transparency. As is reflected in our vision statement for this project, the goal is to create systems and standards which will serve as a nationwide model for first mile/last mile transit service, allowing cities across America to work together towards our mutual goal of reducing traffic congestion and GHG emission, thereby avoiding the grim predictions of the U.S. DOT's "2045" study. The City of Sacramento will make available any information that comes out of the project which is not protected under a private intellectual property arrangement (see previous response). Information which will be publicly available will include, but not be limited to transit ridership, mode share, real time transit vehicle location, bike share availability, traffic volumes, GHG offsets, project capital and O&M costs, and the annual monitoring report.

Question 9 (part 7): Describe the terms and conditions that exist or will be established and managed in partnership agreements, data or information sharing agreements, agency specific policies and operating procedures to establish and maintain the systems and interfaces to maintain the integrity of the data and share the information identified in the proposal

Vehicle to vehicle and vehicle to infrastructure data exchanges will be encrypted and follow strict protocol, typical of DSRC. Data transfer sessions will be in short bursts to minimize hacking opportunities. Each data exchange party will be assigned a random ID that will be purged at the end of each session, so there is no link to individuals, vehicles, or agencies for hackers to mine. These are proven strategies that have protected electronic toll collection systems from hacking for many years.

Data sharing among partner agencies will be in synthesized forms such as volume, speed, dynamic, and trend, posted on private, password protected website. There is absolutely no personal data of any kind that may attract criminal activity.



10

Question 10: Describe your approach for using existing standards, architectures, and certification processes for ITS and connected vehicle based technologies and plans for documenting experiences and cooperating with architecture and standards developers to improve the quality of these products based on lessons learned in deployment.

Sacramento will adhere to the national ITS architecture, which is also the standard on which SACOG will be basing all of its regional ITS infrastructure deployment. As stated previously, AETV program design will be in accordance with CVRIA standards, as well as upcoming FHWA Connected Vehicle infrastructure deployment guidance (http://www.its.dot.gov/meetings/pdf/V2L_DeploymentGuidanceDraftv9.pdf).

11

Question 11: Provide measurable goals and objectives for your vision and describe your approach for monitoring the impact of the demonstration on mobility, safety, efficiency, sustainability, and climate change.

Performance measures will be used throughout the planning and implementation phases. For planning purposes, the Sacramento Team has drafted the following proposed project goals:

- Achieve a measurable increase in light rail ridership
- Achieve a measurable reduction in VMT
- Work with SACOG to integrate project elements into regional ITS master plan
- Use program as a demonstration for the California state legislature with the objective of pressing for more progressive autonomous vehicle standards and avenues to incentivize electric vehicles & the infrastructure to charge them
- Generate analytic data to support the utility of the program in order to promote pilot projects in other cities
- Operate AETV's with a better accident rate than the regional average for similar facilities
- Through pre- and post- program user surveys, enhance the public image of light rail/transit system

12

Question 12: Provide evidence that establishes your capacity to take on a project of this magnitude, including executive commitment, workforce capacity, degree of infrastructure readiness, data and performance management capabilities.

Large Project Experience

The City of Sacramento prides itself on its ability to take on large, complex, federally funded projects. The City of Sacramento has delivered over \$1 billion dollars in federal projects over the last 20 years with regular FHWA audits demonstrating efficient value-add project delivery acumen. Recent project



Figure 17: Light Rail Station Along the Recent Blue Line Extension

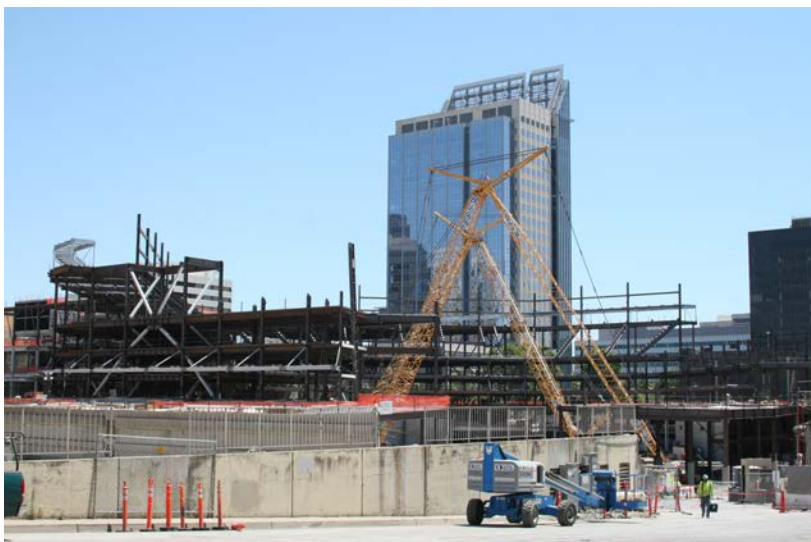


Figure 18: Golden 1 Center Under Construction in June 2015

experience includes the delivery of a \$100 million interchange on Interstate 5 and a current project to construct a federally funded \$80 million moveable bridge across the Sacramento River. SACRT has recently completed a major light rail extension project and is in the process of preparing an environmental document for a multimodal bridge over the American River. In addition, the City is a partner in the delivery of the new \$500 million Golden 1 Center sports and entertainment venue, which is on track to meet the NBA's aggressive opening day schedule.

Executive Commitment

There are many examples of executive commitment to innovation in the Sacramento region. The efforts taken to stave off purchase offers for the region's only professional sports team, the Kings, and



the planning of a new streetcar system are examples. More broadly, the creation and implementation of the Blueprint smart growth policy and subsequent sponsorship and implementation of SB 375 stand as testament to courageous and progressive policy making. These initiatives were driven at the executive level and have become the gold standard for smart growth land use policy in California and beyond.

Workforce Resources

One of the advantageous aspects of the Sacramento proposal is that it does not propose a new program which will require a significant increase in operations or labor costs. The traffic operations center, the private TNC community, and the light rail system are all currently up and running. The proposed project will dovetail with these existing systems to make them more user friendly and efficient without requiring significant extra workforce.

Infrastructure Readiness

The City already has a light rail system and operator, and a TOC with an extensive fiber based interconnect system. Transit pre-emption is already standard operating procedure for the City. The City of Sacramento's infrastructure is ready for implementation of this project.

Data and Performance Management Capabilities

The City of Sacramento has been actively engaged in the California multi-agency benchmarking study since its inception in 2002 (<http://eng.lacity.org/techdocs/cabm/>). This is a collaboration between the seven largest cities in California to continuously measure our project delivery performance against industry standards to ensure public value. This process has not only proven to be an invaluable tool for our own performance management, but also for our ability to handle large volumes of project delivery data and boil it down into useful information.

13

Question 13: Describe any opportunities to leverage Federal resources through cost share, in-kind donations, and partnering.

This project will involve sizable in-kind labor contributions from all partners. Significant economic stimulus effects are likely to result with the introduction of the first autonomous transit vehicles in California. Providing a model for first mile/last mile solution which is easily scalable through TNC partnership may open up significantly increased ridership on light rail systems around the U.S., which again, are constructed with large amounts of federal funds.