February 2, 2016

U.S. Department of Transportation (USDOT)
Federal Highway Administration (FHWA)
Office of Acquisition and Grants Management
1200 New Jersey Avenue, SE
Mail Drop: E62-204
Washington DC 20590
Attn: Sarah Tarpgaard, HCFA-32

RE: Beyond Traffic: The Smart City Challenge – Smart City Chula Vista

Dear Ms. Tarpgaard,

I am pleased to present the "Smart City Chula Vista" application submission which includes our City's vision to move beyond traffic and address the City's most significant traffic related challenges. Chula Vista is uniquely positioned through our dynamics in people, land-use, infrastructure, and experience in smart growth development to deliver a successful demonstration project to the USDOT. Chula Vista is recognized as a worldwide leader in environmental initiatives and climate action plan efforts.

The challenge in Chula Vista is to connect the east and west urban cores in the City and encourage residents to use alternative modes of transportation and mass transit in lieu of the single occupant vehicle. Our proposal includes a shared fleet of autonomous automobiles and transit vehicles to attract ridership. This will also help bridge the socio-economic gap between the east and west urban cores. While our residents may still own a vehicle, through this project their dependence on it would be greatly reduced.

As required by the Notice of Funding Opportunity (NOFO), our application includes high-level strategies that address Chula Vista's challenges and the 12 Priority Vision Element challenges. These high level actions are made possible through the collaborative efforts of more than 10 partnerships with private industry and State and local agencies. The extent of this collaboration is significant; it shows that we have reached a new era in Smart Cities, one that promises to demonstrate innovative solutions in Chula Vista to solve National transportation challenges.

The real challenge lies ahead in detailing our high-level vision and solutions presented in this document. With strong, unanimous support from our City Council, the benefits of this proposal are far reaching and it is my hope that Smart City Chula Vista will be recommended for selection. As a testament to our own local government commitment, please find our attached resolution.

Sincerely,

MARY CASILLAS SALAS
Mayor
City of Chula Vista

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1 Introduction

The City of Chula Vista is poised to embark upon the next chapter in its history, implementing a vision of a 21st century Smart City – "Smart City Chula Vista". This vision is embodied in the City's character, rising to new challenges with recognized leadership in executing Smart City initiatives. At the core of this vision is a robust, technically advanced transportation network that moves the City's lifeblood, our citizens, safely and efficiently through the City.

1.1 Vision

Smart City Chula Vista will work with the "first and last mile service provider" companies like Lyft, Car2Go and others to provide a seamless, modern and responsive public/ private transit system to our citizens and to our guests. In addition, Chula Vista will provide electric Autonomous Vehicles in the project area from neighborhoods and centers to the nearest bus/ trolley stop.

Smart City Chula Vista seeks to change the pattern of the typical commute from one of commuting in a bubble to one of commuting in an open environment where connectivity provides maximum safety and efficiency and empowers the public with choice through information promoting multi-modal opportunities. This project proposes to utilize Smart City technology and information to connect our City, both geographically and on the information network. The benefits of this project are significant; vehicles and traffic signals throughout the community will be connected and this will increase public safety, shorten commutes, reduce greenhouse gasses, improve public health, and increase mobility at intersections for all modes of travel including motorists, bicyclists, pedestrians, transit, freight, and emergency vehicles.

The city envisions providing alternatives to the shorter routine daily trips, which include trips to the transit stations, and would benefit both east and west side residents. A shared fleet of small autonomous vehicles would provide this type of service, but this technology is still developing. Enhancing existing local transit overall would be beneficial. This would serve the needs of the residents without dependence on their own vehicle. This could also help bridge the socio-economic gap between east and west by providing convenient service between the east and west urban cores as well as the Bayfront development. This concept is another item we want to focus on for the grant.

The policy changes have led to Chula Vista becoming a smarter city, with development practices now delivering many initiatives. A sample of Chula Vista's smarter city initiatives include:

- The Bayfront Smart City brings **the latest in infrastructure technology for maximum energy efficiency and sustainability** outcomes to the largest waterfront development on the West Coast,
- One of the largest Neighborhood Electric Vehicle (NEV) roadway networks in the Country,
- One of the most dense networks of Electric Vehicle (EV) charging stations in the Country,
- And the **ACT Chula Vista citizen web portal** connecting citizens with each other and City services creating a web-based connected community platform.

Accolades are a testament to our success and as a highlight the City received the 2014 EPA Center for Corporate Leadership, Climate Leadership Award for exemplary climate actions directly related to Chula Vista's Smart City initiatives.

Central to Chula Vista's commitment to plan and execute smarter, is a diverse state-of-the-art transportation system that leverages infrastructure and smart technology to move vehicles, people, and information across all modes. The City directs significant investment toward transportation infrastructure and systems. Major infrastructure projects with significant technology elements are currently underway in Chula Vista including:
- South Bay BRT dedicated Bus Rapid Transit guideway construction,
- Modernization of the trolley network in the City including vehicles, stations, and track,
- Bayshore Bikeway class 1 bike path construction,
- Expansion and modernization of the City's fiber optic network for traffic signal communications, and expanding and modernizing the existing Traffic Management Center

No longer will Chula Vista embrace traditional auto-centric development, the City would become a champion of Smart Growth and exact policies that embrace urban design practices including: high density communities, mixed use development, active transportation for pedestrians and bicyclists, and transit oriented development. So, although we believe we have been working smartly, we do feel that success in the Smart Cities Challenge, will help to make us not only Smarter, but also Wise.

1.2   Challenge

Historically, the City's planning model spurred the development of suburbs outside the urban core that are characterized by separated land uses, especially between residential and non-residential uses. Zoning ordinances created barriers to protect residential communities from mixed land-uses. This "conventional" planning model of separation was enabled by the automobile and building automobile-centric transportation infrastructure. This included freeways, large arterials, wide local roads, and large parking areas.

Then about 30 years ago, the City of Chula Vista became a pioneer in developing and implementing smart growth policies and practices. Needing a vision of how new subdivisions would contribute to the character of the city while maintaining a desirable level of service and quality of life, a plan for smart growth was adopted. The policies were refined as more and more of the city expanded to the unincorporated portions east of the original city limits. The

newer east side communities were developed with high density village centers and an eastern urban core. The village centers included major transit centers that were planned from the outset to be connected together with a Bus Rapid Transit (BRT) line that would lead south to the International Mexican Border and north to the San Diego central business district. The City's vision of transit oriented planning continues, and the BRT is now under construction.

In fact the rapid bus that is currently under construction has a 5-mile dedicated guideway that initially was planned for a light rail system. As the use increases and more and more users demand additional service areas, the west side will also see changes as these areas redevelop into higher density neighborhoods that make mass transit more appealing and become more typical of everyday life. The vision is that both sides will eventually have easy access to mass transit for trips across the city and meld the west and east side into one efficient mass transit network.

The challenge for the newer communities is to get the residents in these areas to embrace and use the mass transit facilities to/from work instead of the single occupancy vehicle trip.

The City of Chula Vista's traditional older west side also has an urban core and is served by the Blue Line trolley. Ridership on the Blue line is very high for commuter trips. The west side has a much lower income demographic. The city then has been challenged with filling the large socio-economic divide between the East and West side residents.

Promoting and providing safe and efficient transit between the two urban cores is a vision that would help the economic vitality of the city.

Our public still needs their cars. The typical household in Chula Vista requires a minimum of two cars for work related trips twice a day to commute the distance between the City's population centers and regional employment centers. The cars are also necessary for more frequent local trips such as running errands and recreational activities. This need for the automobile manifests into the largest segment of transportation infrastructure demand on our roadways: the single occupant automobile. Overcoming the single occupant automobile as the travel mode of choice is our City's most serious transportation challenge.

The typical travel scenario in Chula Vista consists of two types of automobile trips: the commute and the non-commute. The commute represents the work trip from our neighborhoods onto the local roadway, arterial network, regional freeway network, and beyond the City. These trips are regular and occur during two to three hour windows in the morning and evening. The non-commute represents the irregular, shorter distance, more frequent non-work related trip. These trips are typically errand based or recreational and are contained within the City primarily on local and arterial roadways.

The underserved communities that do not own a car and have diminished access to the local and regional transportation system and connected land use attractions. This affects low income households, senior citizens, adolescents, and persons with a disability.

There is also a geographic dichotomy between the east and west areas of the City. The east area of the City is newer and suburban with higher income and the west area of the City is older and urban with lower income. This disparity has perpetuated in part due to a lack of connectivity in the overall transportation system between east and west Chula Vista.
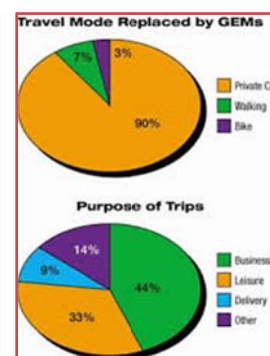
1.3   Technical Approach

Our technical approach seizes on the opportunity of these locally and regionally significant projects to incorporate the USDOT 12 vision elements for a comprehensive Smart City demonstration that addresses Chula Vista's real-world issues.

- Projects currently under construction will be changed to incorporate Smart City innovations and technology.
- Projects earmarked for Smart City construction will be advanced for implementation prior to the demonstration.
- Existing roadways will be redesigned providing dedicated and limited shared use lanes for autonomous vehicles.
- Existing roadway infrastructure will be outfitted with new equipment serving autonomous, connected, and machine data collection technology.
- The City will provide new services promoting the shared economy in transportation including an autonomous vehicle share service, smart bicycle share service, discounted fares for seniors and youth, and web portals and applications for ease of service use.
- The City will promote the choices in a public outreach campaign to generate a high level of interest and participation.

Several currently identified, funded, and/ or under construction projects that will be advanced for Smart City Chula Vista include:

- Chula Vista Bayfront Shuttle Service – this downtown circulator service will be advanced to demonstrate frequent autonomous shuttle service transit vehicles. A portion of the route will be dedicated.
- South Bay BRT – Phase 1 currently in construction and includes a 12-mile transit line between the Otway Mesa Port of Entry and Downtown San Diego (see Figure 2). The project will include seven stations, a Direct Access Ramp, arterial transit-only lanes (dedicated guideway and bus on shoulder), transit signal priority, and enhanced customer amenities. This phase is estimates $113 million.
- Connected infrastructure technology will be implemented along the route.
- Procurement of new vehicles will incorporate autonomous and connected vehicle technology.
- The route will be designated shared use with high occupancy autonomous vehicles.

- Bayshore Bikeway – This regional dedicated bike path will be outfitted with connected bike technology.
- Otay Ranch NEV – The City will reinstitute the successful Otay Ranch Neighborhood Electric Vehicle program. The new program vehicles will be an autonomous fleet.
- Telegraph Canyon Road Smart Corridor – Telegraph Canyon Road is one of the City's primary arterials connecting east and west. This corridor has an extensive number of Intelligent Transportation System deployments including: machine readable data collection systems, adaptive signal systems, and high speed communication systems. This corridor will be designated a Smart Corridor with infrastructure upgrades for the purposes of promoting autonomous vehicles and connected vehicles and infrastructure.

We offer the City's diverse infrastructure for all modes of transportation to demonstrate this project including:

- All classifications of roadways:
    - Local.
    - Collector.
    - Primary arterial.
- Light rail transit.
- Bus rapid transit.
- Freeways.
- Toll roads.
- Bicycle and pedestrian facilities.

Chula Vista currently operates an Advanced Traffic Management System providing the most current proven technical tools to manage the traffic signal system including:

- Communication connectivity between the traffic signals and TMC.
- A regional fiber optic communication system.
- Regional Arterial Management System which interlinks transportation assets around the region.
- A citywide network of machine monitoring systems providing readable data including volume, speed, and travel time.
- Adaptive Traffic Signal system.
- Transit signal priority systems.
- Emergency Vehicle signal priority systems.

This is the ultimate multi-modal petri-dish for a comprehensive Smart City demonstration/ testing/ data gathering platform. A project site map is provided on Figure 1 Section 4.

The existing systems however, have inherent limitations. They do not intelligently communicate to the vehicle on the roadway or vice versa. At the center of our solution is technology to provide communication between vehicles and vehicles and infrastructure (V2X). Machine readable data generating sensors will be implemented on infrastructure and vehicles including autos, busses, trucks, trolleys, freight, and bikes (both autonomous and connected) to

probe and collect data. Cellular phone applications will be utilized to read pedestrian data. This will provide the maximum amount of data acquisition possible. The system wide data will be provided on an open source platform to analyze, correlate, tabulate and develop traffic signal and vehicle control messages for implementation in real time. This will be an iterative process. Ultimately the result will be a system capable of gathering information from connected vehicles and infrastructure in the field and exchanging information and control techniques to affect both the vehicle operations and traffic signal system operations. This approach is the next major advancement in achieving a safer more efficient transportation system.

1.4   Project Management Approach

SCCV is led by the City of Chula Vista in partnership with local and regional agencies, consulting firms; local manufacturers; and University Transportation Centers. This team is highly qualified and experienced in project management, systems engineering, and successful delivery of complex projects. This expertise reduces project risks through application of proven development methodologies and mitigation strategies.
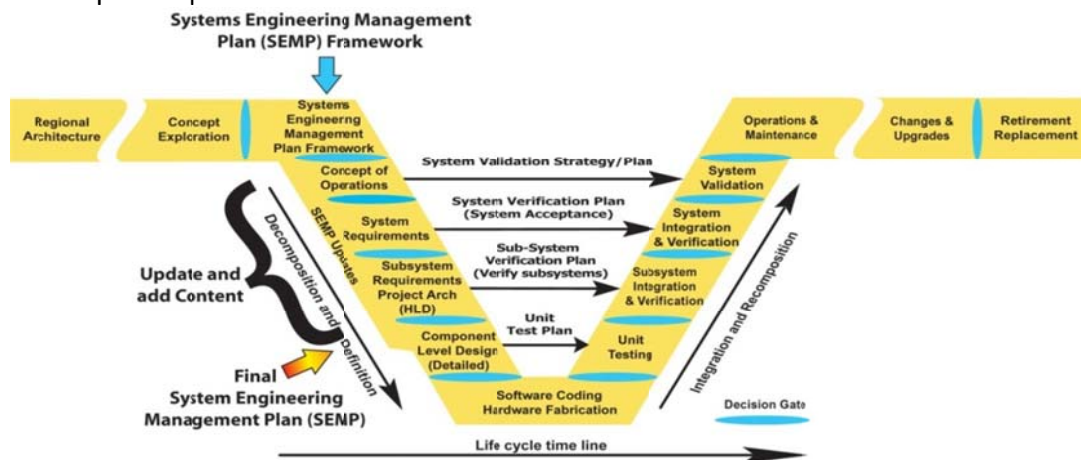
1.4.1   Project Management

A Project Management Plan (PMP) will be created and agreed upon with USDOT as part of the initial activities on the Safety Pilot Model Deployment project. The PMP will draw extensively on the Guide to the Project Management Body of Knowledge (PMBOK Guide), Fourth Edition and the Government Extension to the PMBOK Guide, Third Edition, both published by the Project Management Institute (PMI). These documents represent the state of the practice with respect to the application of proven industry best practices in project management for government contracts.

The PMP will detail how each of the five major project management phases will be used to support the delivery of the project under the Systems Engineering life-cycle during the course of the project. These major process groups are as follows:
- **Project Initiation** – Steps to be taken and procedures to be put in place at the start of the project.
- **Project Planning** – Arrangements for planning the project in terms of schedule, activities, budget, milestones and deliverables.
- **Project Execution** – Arrangements for managing the implementation of the major project elements.
- **Project Control and Monitoring** – Arrangements for monitoring and control including progress reporting and the use of PERT and financial management tools.
- **Project Closing** – Arrangements for closing each stage of the project including the planning, design, and implementation and operations phases of the Safety Pilot Model Deployment.

The City of Chula Vista will retain responsibility for producing the Systems Engineering Management Plan (SEMP) as a necessary function of planning for and execution of the project. Development of the SEMP will follow the IEEE Standard for Application and Management of the

Systems Engineering Process [IEEE-1220], which focuses on the engineering activities necessary to guide project development. Annex B of IEEE-1220 will be presented upon completion of the SEMP development phase.

1.4.2 Earned Value Management System (EVMS)

The City of Chula Vista will utilize an Earned Value Management System as required in compliance with the guidelines in ANSI/EIA Standard 748. The project controls in this system will help measure, monitor, and report project progress. Our team will utilize a system that the project management team has developed for tracking large programs for their clients. The system has been utilized for years and has evolved to a robust reporting tool. Templates have been established that will generate charts that can communicate the progress of the project as well as help identify potential risks early on the project.

1.4.3 Master Project Schedule

The Master Project Schedule will be completed using Microsoft Project. During the first four phases of the project highlighted in the management approach above, Critical Path elements will be reviewed with SCCV members on a monthly basis after the baseline has been captured. Re-baselining will occur only with USDOT input and approval.

1.4.4 Property and Configuration Management Plan

The Property and Configuration Management Plan will keep track of all procured and controlled equipment and software. The Property and Configuration Management Plan will be used to specify the Configuration Management Data Base or Asset Management Data Base, which is used within the context of the project to minimize the impact of changes; provide accurate information on asset configuration states; improve the security of asset distribution; facilitate adherence to legal obligations under the project; and help with financial and expenditure planning.

1.4.5 Risk Management Plan

Risk mitigation for the project will be conducted according to recognized principles and established practices. The risks associated with the planning, design, implementation and

operation of the SCCV project will be identified and assessed, and a series of avoidance and mitigation strategies will be developed.

1.4.6   System Interoperability Test Plan

Concurrent with the delivery of the PMP, the City of Chula Vista will submit our System Interoperability Test plan which will describe our proposed testing activities, as described in the overall technical approach above. This test plan will call out in detail the planned testing of all field elements for the pre-model deployment testing.

1.4.7   Management Reporting

The Program Manager will direct his staff to collect reporting information from each of the task leads. He will coordinate this into the monthly progress reports, invoices and earned value report for delivery to the USDOT.   The City of Chula Vista will propose the use of SharePoint/Dashboard Tools for this purpose.

1.4.7.1 Monthly Progress Reports and Quarterly Reviews

The City of Chula Vista will create monthly progress reports that will include the monthly earned value report. Briefings will be given at quarterly program reviews conducted by the USDOT. Monthly reporting will include the following key areas:
- Project financial status – Major budget categories as defined in the WBS will indicate the total budget, commitments, and expenditures, as well as estimate-at-completion.
- Upcoming-month tasks and action items and schedule adjustments, if any.
- Milestone analysis – Current or projected progress against the budget or schedule baseline will be clearly identified, including task completion and mitigation/recovery plans.
- Risk management summary –Risks will be identified and tracked.
- Outreach activity summary.

1.4.8   Updated Project Schedules

Project schedules will be updated bi-weekly by task team leads and organization through central reporting to the program manager. Task and sub-task leaders will be responsible for monitoring and reporting progress as reflected in sub-level schedules. Based on feedback from the team, these will be referenced directly into the master project schedule. This will be done on a weekly basis through a web based portal.

2   Chula Vista Population Characteristics

Chula Vista is and will remain the second largest City in the San Diego Region. Our 2010 Census population was 243,916, which amounted to 7.9% of the Census' 3,095,313 population for the San Diego Region.   The most recent available official population estimate for Chula Vista (1/1/2015) from the California State Department of Finance (DOF) is 257,989, which represents 8% of the Region's 3,227,496 DOF population figure.   From the standpoint of future projected buildout conditions within the Region, as derived from SANDAG's recent Series 13 Regional Growth Forecast, this general relationship remains with Chula Vista's 2050 population at 345,586, compared to the Region's at 4,068,759; or 8.5%.   Using these figures, and our City

area of 50.9 sq. mi., our City population density was 4,792 persons/sq. mi. in 2010, 5,068/sq. mi. in 2015, and will be 6,790/sq. mi. at buildout.

As can be seen, although Chula Vista is large and growing City, and consistently the second largest in the Region behind the City of San Diego, we are disadvantaged by the extremely large size of the San Diego Region, and the City of San Diego within the Region, in comparison to the size of other Census regions across the Country. By observation, a similar situation exists within the Los Angeles Region. While statistical sets were not readily available, if one were to consider for example, the southern half of the San Diego Region (comparable in size to many other Census regions across the Country), the Chula Vista's representative population would far exceed the 15% level referenced. Chula Vista's characteristics strongly align with the USDOT's characteristics for a Smart City and is highly committed to the Smart City Chula Vista project.

3   Chula Vista Characteristics Alignment

3.1   Public Transportation System

Chula Vista's public transportation system is shown below. The MTS Trolley Blue Line serves Southern San Diego County, running between San Diego's Old Town and Downtown San Diego down to the US-Mexico Border. Chula Vista has three trolley stations: Bayfront/E Street, H Street, and Palomar Street.

3.2   Conducive Demonstration Environment

The City of Chula Vista is a Smart City initiative leader. A sample of Chula Vista's smart city initiatives include:

- The Bayfront Smart City which is the largest waterfront development on the West Coast. The Smart City plan for this development will be the model for the entire City.
- One of the densest networks of Electric Vehicle (EV) charging stations in the Country.

- The City received the 2014 EPA Center for Corporate Leadership, Climate Leadership Award for exemplary climate actions directly related to Chula Vista's Smart City initiatives.
- Chula Vista offers a diverse state-of-the-art transportation system that leverages infrastructure and smart technology to move vehicles, people, and information across all modes. This includes roadways, light rail transit, bus rapid transit, freeways, toll roads, bicycle and pedestrian facilities.
- Chula Vista currently operates an Advanced Traffic Management System providing the most current proven technical tools to manage the traffic signal system including.

3.3   Leadership Continuity

The City of Chula Vista has continuity of committed leadership and capacity to carry out the demonstration throughout the period of performance. This is demonstrated by the strong support from our Mayor and City Council, passing the SCCV Council Resolution unanimously.

3.4   Commitment to Shared Economy

Smart City Chula Vista is committed to integrating with the Sharing Economy as demonstrated by the City's support of the recent Car2Go pilot program. The City also operates a car share program for City staff located at City Hall and has recently initiated a bike share program with locations including transit centers and recreational facilities. Uber and Lyft are also provide service in the City.

3.5   Commitment to Open Accessible Data

The City of Chula Vista is committed to making open, machine-readable data accessible, discoverable and usable by the public to fuel entrepreneurship and innovation.

4   Preliminary Site Map

The SCCV Preliminary Site Map is shown on Figure 1 on the following page. The map identifies the proposed project site and locations of key project implementations.

Figure 1: Smart City Chula Vista Preliminary Site Map

5   Holistic Approach to Vision Element Alignment

Chula Vista is challenged by inefficient use of the transportation system (roadway and transit) and lack of analytics. From oversized buses to antiquated parking meters, outdated traffic signal management center, to proprietary toll charging, Chula Vista is ready for new technologies to migrate its current transportation to smart transportation.

Smart City Chula Vista will implement on the designated corridors: Automated Vehicles (AV) of various modes, Connected Vehicles (V2V and V2I), and Intelligent Sensor Based Infrastructure. The routes consist of a combination of mode specific and shared use lanes and roads. This holistic approach integrates the various roadway and modal types and combines the Vision Elements into one comprehensive demonstration platform. Refer to Figure 1 to orient the following route descriptions.

- In the west urban core, the **Downtown Circulator** will operate on dedicated lanes along F Street and shared lanes along the remainder of the route. There will be stops at Blue Line Trolley stations at E and H Streets and at the H Street South Bay BRT Transit Center.
- Two transit services will operate between the urban core and Otay Valley (the eastern portion of the City):
  o The **Chula Vista Connector** will operate on the South Bay BRT guideway between the Otay Ranch Town Center and the East Palomar Street Station. Connector service will continue between the East Palomar Street Station and the H Street Blue Line Trolley Station.
  o The **South Bay BRT** will operate along its entire route connecting the Otay Mesa International Transit Center with Downtown San Diego. Within the project corridor the service runs between the Otay Ranch Town Center and the East Palomar Street Stations.
- The **Otay Ranch Circulator** will operate along neighborhood roadways in the east urban centers connecting with the Otay Ranch Town Center Station.

These routes serve high demand destinations and make it convenient for travelers to use the system. Smart City Chula Vista demonstrates advantages throughout the project area for AV transit, AV automobiles, Connected Vehicles (CV), Intelligent Sensor Based Infrastructure, and all Vision Elements:
- A dense downtown urban test bed with dedicated lanes.
- A dense suburban neighborhood test bed.
- Shared lanes test bed.
- Dedicated arterial guideway lanes.
- "Bus on Shoulders" freeway lanes.
- Dedicated pedestrian and bikeway facilities.
- Transit facilities (LRT and BRT).
- Tolling plazas and facilities.
- Port facilities.

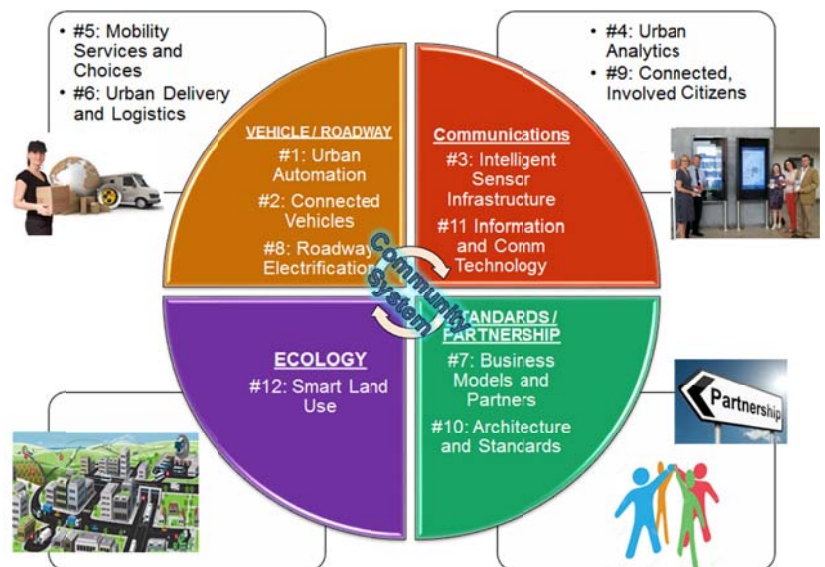### 5.0.1 Technology, Urban Transportation, and Smart City Elements

In order to provide this holistic approach to smart transportation, there are a number of underlying technologies that need to be integrated:

- Connectivity – cost effective and persistent network wide wireless and wired connectivity.
- Data platform – common backend data platform and format for collection, display, control and analysis.
- Control and Automation – the entire transportation network should be integrated with control and automation holistically.

Once the Smart City is synergized, all of the vision elements can be wholly analyzed and operationally optimized to provide our citizens the most efficient and high quality transportation network.

Our holistic view of all 12 Vision Elements is represented on the SCCV diagram.

In the orange quarter circle of Vehicle/ Roadway, the autonomous, connected vehicles with electrified roads (Vision Elements #1, 2 and 8) are the baseline enabler for smart transportation. Extension of that would be Vision Element #5 and 6 in giving the citizens mobility choices while increasing delivery efficiency by exploiting the unused capacity.

Moving to the Communications quarter circle, intelligent sensors and information/ communications technology (Vision Elements #3 and 11) form the basis of data and analytics enablement. Citizens (Vision Element #9) will benefit from the information provided, while the urban analytics (Vision Element #4) will find a home to feed the information into the system.

In the green quarter circle, partnership and standards (Vision Elements #7 and 10) are essential for bringing innovative technology into reality, as well as interoperability. This ties in with the other quadrants in terms of requirement feedback and technology development.

Addressing the next-generation of urban transportation is our Smart Land Use goal. Our approach to smart transportation means we re-imagine and use existing infrastructure where possible, make them smart and multi-purpose. This provides the necessary advances in technology while extending budgets for further improvements.
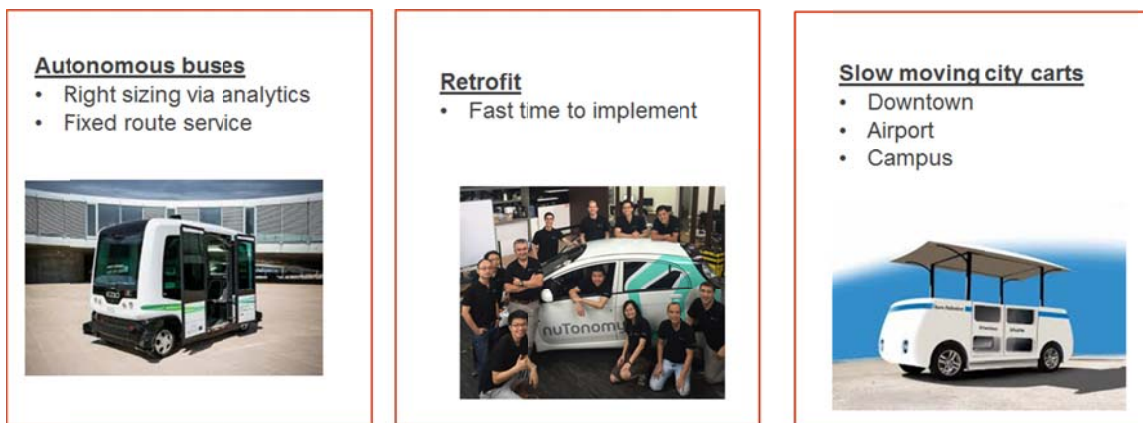
All of the Vision Elements will leverage the SCCV common data infrastructure. We envision that the Chula Vista will host the SCCV, however there are scenarios where our University Transportation Center (UTC) partners at UC Berkeley and Riverside may better serve the role, creating strong linkages between the data and the Innovation Engines that Academic Research produce.

5.1   Vision Element #1 Urban Automation

Solutions to make public transit more attractive, ubiquitous, and smart are at the core of our approach to urban automation. The previously identified circulators in the eastern and western urban cores will be outfitted with lateral and longitudinal control. The circulators will communicate with connected infrastructure [V2I] along the fixed route. SCCV recognizes that the AV capabilities are still emerging. The circulators will be NHTSA Level 3 AV's. The ultimate vision is to have the circulators operate as fully autonomous vehicles.

The circulators will reduce operational complexity by following a fixed route. SCCV will retrofit existing vehicles to save cost and quickly achieve the required fleet. Our strategic partnership with the University of California at Riverside [UC CERT] and the federally funded research into the AERIS program will be keys to achieving the vision of SCCV to provide a reliable and environmentally friendly service in our east and west urban cores.

The City will encourage private AV ownership by exploring policy options including: allowing private autonomous vehicle owners to recharge at a reduced rate at charging stations, reduced or no parking fee (coordinated with the City's new smart parking system), dedicated lane use on designated routes, and reduced local sales tax as an incentive to purchase. SCCV will also retrofit City fleet vehicles and operate a City AV car share program at City owned locations. Our goal is to demonstrate 15 Autonomous Vehicles for Smart City Chula Vista.

Autonomous buses
- Right sizing via analytics
- Fixed route service

Retrofit
- Fast time to implement

Slow moving city carts
- Downtown
- Airport
- Campus

5.2   Vision Element #2 Connected Vehicles

To accomplish the challenge goal (Section 1.1.3), the SCCV project envisions deploying a Connected Vehicle ecosystem that will promote safe, convenient, efficient transit service.

The SCCV project will deploy V2X technology for both AV and CV. The project area provides an operational environment where intersections, roadways, and vehicles are able to communicate through multiple communications mediums.

SCCV will deploy a set of innovative applications and services, which will address all of the USDOT objectives for smart transportation; safety, mobility, and the environment. The applications include;

- **Traffic Signal Operations:** SCCV traffic signals will be integrated with solutions that offer dynamic actuation of signal timing, estimating queue lengths at metered freeway on-ramps, transit signal priority, emergency vehicle pre-emption, and recommended speed along a busy arterial, in order to optimize the speed of the arterial users and to enhance eco-driving at the arterial levels. In addition, pedestrian warnings will be delivered to vehicles traveling in the appropriate directions based on the walk/don't walk signal state at an intersection.
- **Advance Incident warning and work zone alerts:** Through a V2X interface, drivers approaching a location with limited sight distance are given advance warning of an incident beyond the line of sight.
- **Transit Applications:** SCCV transit vehicles and route infrastructure will be outfitted with V2X devices for transit related applications including transit signal priority, and transit-based probe data. These vehicles will generate a rich set of DSRC transactions and interactions among multiple modes, and enhance transit safety.
- **Emergency Vehicle Applications:** Vehicles can be alerted to clear the path of an emergency vehicle by utilizing the Emergency Vehicle Alert (EVA) messages. The same EVA message can be used for Emergency Vehicle Preemption to provide right of way at intersections along the emergency route.
- **Cell phone applications:** SCCV will enable DSRC on cell phones. This provides a high degree of penetration with the general public as cell phone applications are preferred. This will provide an open platform for app developers to develop safety, social, consumer, and commercial apps supporting the SCCV project.

Our ecosystem will include 10,000 connected vehicles (transit, emergency, van pools, car pools and commercial), 5,000 connected cell phones, and 150 connected traffic signals. At this pre-mandate phase of the project, the City of Chula Vista will incentivize participation in our V2X ecosystem by: providing discounted transit passes, new toll transponders, discounted cell phone service, and discounted bike shares.

5.3   Vision Element #3 Intelligent, Sensor-Based Infrastructure

The City of Chula Vista collects data, as many cities do, on its primary arterials. It collects this transportation data for the purposes of monitoring the efficiency of the operations at its traffic signals. To be more informed and increase the agility and efficiency of the transportation

system, the SCCV needs a more robust understanding of the movements of all modes within the project corridors.

SCCV is going to use intelligent sensors to record trip information on multiple modes (pedestrians, bicyclists, transit, autos, freight, and emergency vehicles) including: volume, occupancy, speed, travel time, origin/ destination, and parking.

The SCCV will work to deploy intelligent sensors along all project corridors. These sensors will capture both the project baseline, as well as aid in tracking project performance. SCCV expect that success of these intelligent sensors would lead to citywide deployment. All sensors are Commercial-Off-The-Shelf (COTS), proven technology, and readily available.

5.4   Vision Element #4: Urban Analytics.

Although SCCV has good insight into our operations environment, but the data hasn't been used to its advantage. The Vision Elements from #1 to #3 establishes a foundation of intelligent devices that will generate large amounts of new data, the likes of which the City has not dealt with before. Our problem then is the possible underutilization of this data.

The urban analytics are needed to help SCCV predict future conditions and assess operational strategies. SCCV's participation in the Region's Integrated Corridor Management System has established an existing level of familiarity with sharing data for external stakeholders/partners to provide analytical feedback. The Smart City Chula Vista project will provide open data access to private public and academia. We will leverage our strategic partnerships, utilize Federal Government developed standards and industry best practices to provide our data openly to third party providers with expertise in data fusion.   SCCV's approach will provide new insights and unique solutions for public consumption.

5.5   Vision Element #5: User-Focused Mobility Services and Choices.

The western urban core transit system is one of the most sustainable in the MTS system. However the eastern urban core is a planned smart growth community that has matured except for the mass transit element. Folks have been conditioned to use the car out of necessity and now new choices are coming online, however old habits die hard.

A more personalized mobility service and greater choices are required in order for the eastern urban core residents to shift toward a car-lite lifestyle. Communicating to the residents the upcoming options and teach them to look for the choice before deciding to use the car is the need.

SCCV will work with our strategic transit partner to reinstitute the successful pilot rapid bus

program connecting the eastern urban core and downtown San Diego. The buses will be rented during the interim period until the new South Bay BRT services commences. The new rapid bus transit service will match the east core clientele. The service will be coach oriented with modern CV vehicles. The service will be express and non-stop. Information systems will include a fully integrated real time app for smart phones to indicate location of vehicle, estimated time of arrival and duration and cost of ride and the ability to give a full multimodal view of the transportation system.

The vision includes implementing first and last mile strategies by supplementing the Otay Ranch Circulator service with Uber/ Lyft/ Tango car sharing service and bike shares where analytics indicate a sustainable demand. SCCV will promote the service in a public marketing campaign highlighting the **new smart integrated transit option**.

5.6   Vision Element #6: Urban Delivery and Logistics.

The City of Chula Vista is located adjacent to the World's busiest land ports of entry in San Ysidro and Otay Mesa. A byproduct of the freight traffic crossing the border is elevated GHG's. SCCV will work through our strategic partnership with SANDAG and the goods movement program to concentrate on Vision Element #4 and benefit freight specific information exchange.

SCCV will conduct outreach to the local business community and delivery services (UPS, Fedex, US Mail) and explore opportunities to make their operations more efficient through programs similar to FRATIS (Freight Advances Transportation Information System) smart phone apps allowing freight and vehicles to arrange and schedule pick up/drop off.

5.7   Vision Element #7: Strategic Business Models and Partnering Opportunities.

Smart City Chula Vista is located within the San Diego Region which is an innovation hub for the

wireless industry. With many global headquarters located here in the region SCCV is well positioned to utilize their expertise to implement our vision for the Smart City Challenge.

SCCV also brings highly recognized University Transportation Centers to our team including University of California (UC) Berkeley Partners for Advanced Transportation Technology (PATH) and UC Riverside's Bourns College of Engineering - Center for Environmental Research and Technology (CE-CERT). We are also excited to have San

Diego State University on board to provide the Institutional Review Board (IRB) and Human Machine Interface (HMI) program.

5.8   Vision Element #8: Smart Grid, Roadway Electrification, and Electric Vehicles.

Chula Vista is committed to conservation and meeting California's targets stipulated by State Assembly Bill (SB) 375 which set GHG emissions reduction targets statewide. In addition to meeting the requirements of SB 375 the City enacted a Climate Action Plan (CAP) which set higher GHG reduction goals. Contribution by the transportation system to GHG reduction targets is required.

Most recently, the City in consultation with Black & Veatch has kicked off a Smart Grid infrastructure initiative to address needs for advanced energy infrastructure. The City is currently investigating the technical and economic feasibility of a variety of energy technologies, including energy efficiency, demand response, storage, non-renewable energy and renewable energy generation options, and microgrids.

Chula Vista has the highest density **Electric Vehicle (EV) charging station network** on public property in the Country. SCCV vision includes installation of high efficiency wireless charging systems for AV and CV passenger vehicles at existing EV charging stations and transit stations. Routes with dedicated lanes for AV and CV use only, are also candidate locations for wireless charging in motion.

Chula Vista was the first in the region to implement LED lighting technology citywide on our roadways. We are now working with Holophane and Cisco to outfit the street lights with communication and sensor technology to make the system "smart". The **Smart Grid Street Light System** will communicate wirelessly with the connected intelligent sensors, transmitting data generated by the Sensys detectors, bicycle and pedestrian sensors, and smartphone based pedestrian pushbutton apps. The street lights will adapt and dim in absence of detection and return to full luminance when detection occurs. The smart grid street light system will also serve wireless node and gateway locations for V2X communication.

5.9   Vision Element #9: Connected, Involved Citizens

The City of Chula Vista is connected with the community through the ACT Chula Vista citizen web portal. The ACT system is a tool for citizens to report problems and feed in information. The information is reviewed and routed to the appropriate party for action. Once the issue is resolved it is closed and archived and used to generate reports and statistics related to City service.
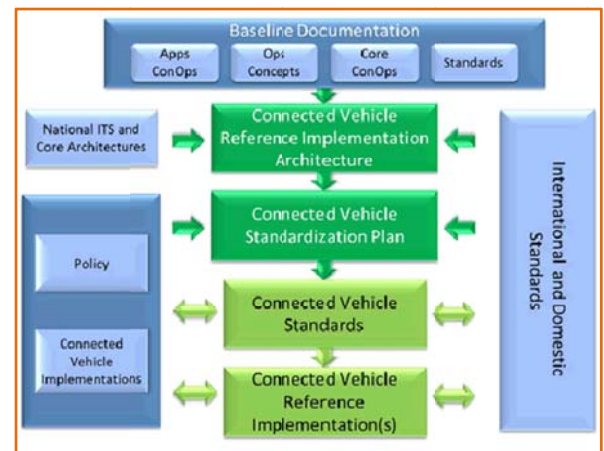
Part of the work conducted under Vision Element #4 Urban Analytics is to fuse more citizen sentiment data. The City will work with ACT developers and to enable open access to city data. The City will also incentivize information distribution innovation with challenge awards. This will become a venue for innovative ideas applied to SCCV.

Our transit partner MTS currently is providing GPS based real time bus arrival times via SMS messages on regular cell phones and via the MTS Go app on smartphones.

5.10   Vision Element #10: Architecture and Standards

As USDOT's connected vehicle effort moves from research to reality, participants will also gain an overview of the infrastructure requirements being developed, including communication standards, operations and maintenance implications, and upcoming policy decisions. In addition, the course will discuss recent ITS-JPO activities and opportunities for participants to

get involved by considering how vehicle-to-infrastructure (V2I) communications and applications could be used to solve their transportation challenges. Connected vehicles will ultimately enhance the mobility and quality of life of all citizens, while helping to reduce the environmental impact of surface transportation.

Our Team will not only use the SET-IT 2.1 tool but we will contribute to the editorial content of emerging standards. Additionally, team partners will develop a "Standards and Architecture" publication to enable understanding and replication of the Smart Cities applications as well as current and anticipated standards to enable deployment and interoperability.

5.11   Vision Element #11: Low-Cost, Efficient, Secure, and Resilient Information and Communications Technology (ICT).

The SCCV vision for ensuring affordability of ICT solutions deployed within the project boundaries will be to conduct a Title IV analysis of any *new* intellectual property developed while working on this project with the USDOT. Furthermore, SCCV will conduct a high-level assessment, based on ISO 26262 to identify hazards, assess risks, and examine safety goals, in our continuing effort to ensure that system compromise is managed gracefully. In addition, collection of Personally Identifiable Information (PII) will be minimized to the situation in which it is unavoidable so that the confidentiality protection requirements of the Institutional Review Board (IRB) only need to be applied to a minimum subset of the data. CVVS vision is to work closely with the USDOT and follow it's guidance on integrating the SCMS into our DSRC environment. We will continue to take input and advice from Standard's Development Organizations, until such time as the USDOT has completed their contract with CAMP on development of the SCMS.

5.12   Vision Element #12: Smart Land Use.

Chula Vista is and continues to be a recognized and awarded leader in smart growth land use planning and development practices dating back to the mid-1980's when planning for large-scale master planned communities commenced, including the 9000 acre Otay Ranch. Over the last 30 years we have evolved the newer eastern portion of our community into a series of compact, walkable, transit-oriented mixed use neighborhoods and "villages" containing a broad complement and balance of uses including a broad range of housing types and densities, schools, commercial services and employment, parks and multiple-species open space preserves among others. These are connected by an extensive network of both on- and off-street pedestrian and bicycle paths. Many of these neighborhoods and villages are also designed and organized along a local and regional Bus Rapid Transit (BRT) system, the backbone of which is currently under construction with in-service operation scheduled for early 2018. That 21-mile route will service 8 neighborhood/village areas and connect them with international border and major employment, cultural and other uses in Downtown San Diego.
Our smart planning continued to evolve during the 1990's with our adoption of one of the first CO_2 Reduction Plans in the nation, which further emphasized our commitment to compact, walkable mixed-use development, and focus on multi-modal transportation options in order to meaningfully reduce greenhouse gas emissions. More recently, the comprehensive update of our General Plan in 2005 is fundamentally organized around smart growth principles, with emphasis on the renewal of the older, western portion of our community through increasing use mix and density in select focus areas tied to both the existing Blue Line Trolley system, and future expansion of the BRT system and a loop shuttle service. That BRT system expansion will accomplish connection of our newer eastern communities with our historic civic core, and a myriad of existing social and community services, as well as to our emerging Bayfront hotel and conference center development that will generate a significant regional draw. Our Urban Core Specific Plan adopted in 2006 utilizes a contemporary form-based code to guide these smart-growth urban renewal efforts.

Continuing our progressive smart planning reputation, we are currently underway in earnest with our Healthy Chula Vista program in cooperation with a broad-based coalition of community partners to promote and achieve a full complement of healthy planning, eating and living initiatives. This includes recent adoption of a Complete Streets Policy, and a current effort to reconfigure one of our oldest north-south streets, Broadway (historically our Highway 101), into a bicycle friendly boulevard.

6   Risk Mitigation

Risk mitigation for the project will be conducted according to recognized principles and established practices. The risks associated with the planning, design, implementation and operation of the Smart City Chula Vista project will be identified and assessed, and a series of

avoidance and mitigation strategies to be developed prior to contract execution. The approach will be to manage risk on the project through the delivery of;

- System Interoperability Test Plan
- Safety/Threat Plan
- Obtaining Human Use Approval through UTC Institutional Review Board (IRB)
- Develop Training Materials, and
- Coordination and Preparation of Vehicle Fleets and Drivers

Key technical, policy, and institutional risks associated with the SCCV deployment vision are rated and shown in the Part 2.

7　The SCCV Team

The SCCV Team Organization Chart showing our committed partners and stakeholders is shown on the following page. Letters of Support and Commitment from are partners are included in Part 2.
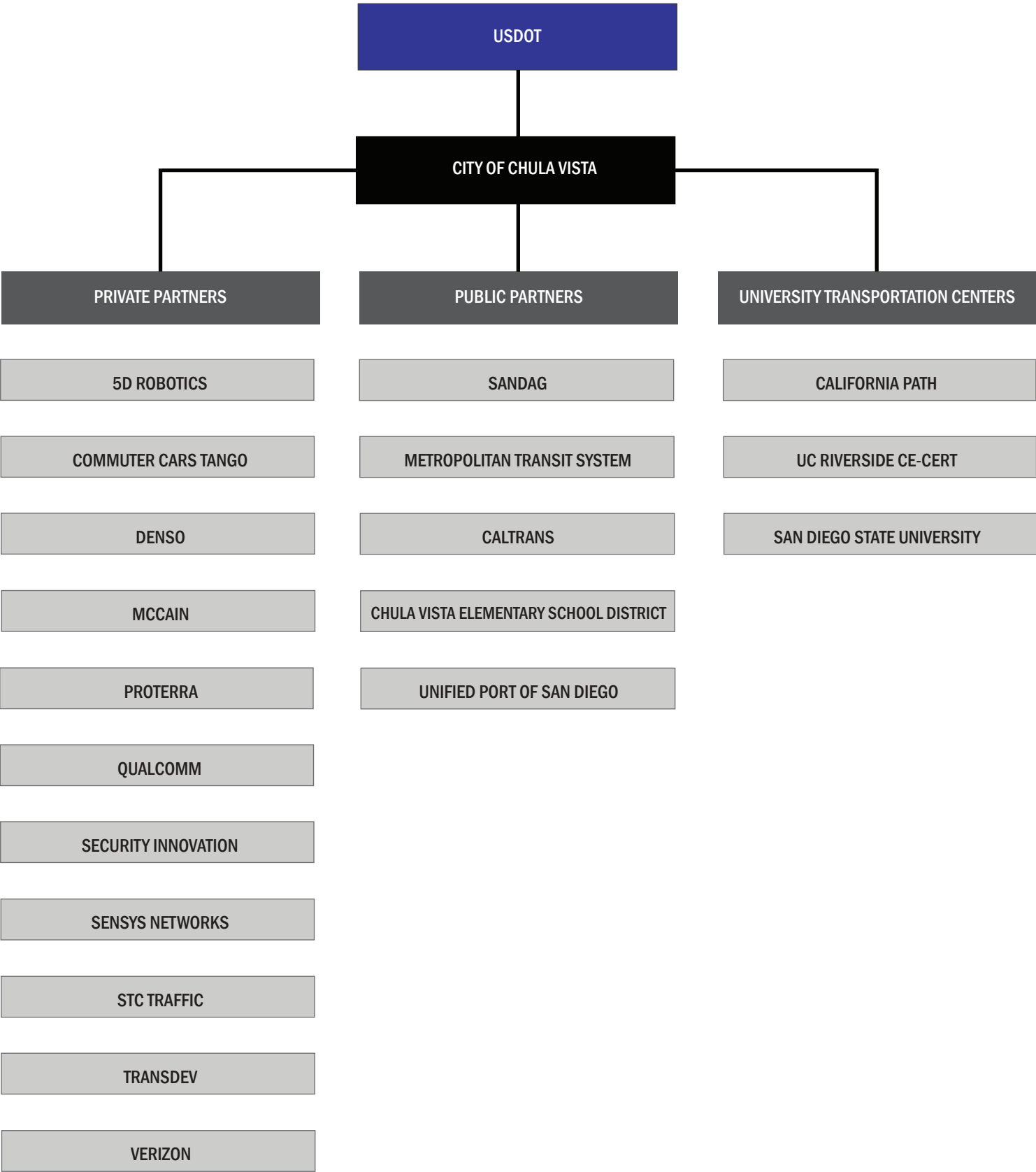
7.1　Governing Processes

SCCV has established a strong partnership and will develop a Charter for the key partners that will conduct the project. This agreement will cover the roles of the different partners, the governance of the agreement, and provides a structure for moving forward. The Charter will establish a Program Management Council, representing the City of Chula Vista and partners.

8　Transportation Infrastructure and System

Chula Vista's existing transportation infrastructure and system features are described below:

A.　The existing Chula Vista transportation system infrastructure includes 274 traffic signals under local control, 10 signals operated by the city of Chula Vista under an agreement with SANDAG for operating the State Route 125 Toll Road and 25 traffic signals within the city limits, but operated by the California Department of Transportation (Caltrans) for Interstate-5, Interstate-805 and State Route 54.

B.　The city roadway network totals 463.30 centerline miles of streets, of which arterials total 58.25 centerline miles and the collector roadways total 76.85 centerline miles. Residential streets and other minor roadways make up the remainder of almost 330 centerline miles.

Freeway miles through the city limits total 15.29 miles of which they are as follows: Interstate-5 has 3.67-miles, Interstate-805 has 4.78-miles, State Route-54 has 0.70-miles and the State Route-125 Toll Road has 6.14-miles.

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USDOT

CITY OF CHULA VISTA

PRIVATE PARTNERS	PUBLIC PARTNERS	UNIVERSITY TRANSPORTATION CENTERS
5D ROBOTICS	SANDAG	CALIFORNIA PATH
COMMUTER CARS TANGO	METROPOLITAN TRANSIT SYSTEM	UC RIVERSIDE CE-CERT
DENSO	CALTRANS	SAN DIEGO STATE UNIVERSITY
MCCAIN	CHULA VISTA ELEMENTARY SCHOOL DISTRICT	
PROTERRA	UNIFIED PORT OF SAN DIEGO	
QUALCOMM		
SECURITY INNOVATION		
SENSYS NETWORKS		
STC TRAFFIC		
TRANSDEV		
VERIZON		

C. Transit services are provided by 7 local routes and 2 regional routes totaling 79 miles of service within the city limits. In addition, the city is served by the San Diego County's busiest light rail trolley system, the Blue Line Trolley, which parallels the Interstate-5 corridor from the international border with Mexico to downtown San Diego, a distance of approximately 14-miles. The Blue Line LRT averages almost 50,000 daily passengers.

D. City Chula has several shared use mobility services including: Uber and Lyft, Facilitating Access to Coordinated Transportation (FACT) program, and Rideshare. Additionally iCommute provides the following programs:
- Citizens can access RideMatcher for a simple and secure way to find carpool partners online. Offers up to $400 in Vanpool Incentives per month to help offset van leasing costs.
- Provides the Guaranteed Ride Home program in case of a family emergency or unscheduled overtime.
- Provides a special ride matching service called School Pool for parents of children, who attend the same school.

E. Information and communication technology (ICT)

F. The San Diego region has long been a national leader in the design and implementation of innovative approaches to transportation issues, including, for example, traffic and demand management. The San Diego Association of Governments (SANDAG) and the Metropolitan Planning Organization for the San Diego region, have a long track record of leading-edge transportation deployments and a proven track record of institutional and cooperative partnerships with local and regional transportation agencies. As a result, San Diego Region has already deployed state of the art systems for managing the region's traffic signals, ramp meters, freeways, and transit services as well as the implementation of a number of regional or mode-specific management systems that are currently in operation, including the freeway management system known as ATMS 2005, the Regional Arterial Management System (RAMS), and a Regional Transit Management System (RTMS). Connecting these individual systems is the Intermodal Transportation Management System (IMTMS) and the most advanced Integrated Corridor Management (ICM) System in the nation along the I-15 corridor. SANDAG has also deployed ITS demand management tools such as the FasTrak® system for dynamic pricing for high occupancy toll lanes, a smartcard payment system for transit and financial incentives for ridesharing, and an automated multi-modal advanced traveler information system – its 511 system. These deployments have helped to develop a solid foundation for intelligent transportation in the San Diego Region and provide a compelling case for SCCV's selection as the host the Smart City Challenge project.

G. The City of Chula Vista has the highest density Electric Vehicle (EV) charging station network on public property in the Country. The City, in partnership with private companies, offers CNG at 12 municipal sites throughout the City.

Members of the public can access the City's alternative fuel stations 24 hours a day and use their credit cards for payment. EV owners can also join the BLINK network to streamline the payment process.

A number of City facilities utilize solar panels and City buildings are LEED certified.

9 Data Collection

The City of Chula Vista collects extensive Growth Management data to monitor city resources and services for quality of life indicators. These monitored resources and services are: Air Quality, Finance, Police/ Fire and Emergency Medical Services, Schools, Libraries, Parks & Recreation, Water, Sewer, Drainage, and Traffic.

9.1 Data Use

The City has existing procedures and practices in place to share this data within city departments and agencies/ entities throughout the Region.

9.2 Data Integration

Existing data and new data collected for the SCCV (Smart City Chula Vista) demonstration will be compared, tabulated, correlated and analyzed by UC Berkeley PATH and UCR CE/CERT to quantitatively determine improvements and areas needing improvement. The results will promote advances to implement in the selected demonstration area for further data gathering, reanalysis and fine tuning of the results.

Transportation data will be shared with Emergency Service providers, MTS, Caltrans, Police, private transit providers (Lyft, Uber and others), parking operators, AV manufacturers, DSRC equipment and vehicle manufacturers (and all entities participating in this demonstration). The data streams coming from CCTV camera video will be accessible in real-time and also recorded and archived enabling retrieval for analysis throughout the study period.

9.2.1 Transportation Data

The City of Chula Vista currently operates a robust system of machine readable data collection devices providing a rich source of traffic data including:

- Vehicular volume counts from Sensys Networks devices and Induction Loop Detectors.
- Volume, Occupancy, and Speed data through the City's Adaptive Traffic Signal System (SCATS). The Smart City Chula Vista project will utilize the adaptive traffic signal system for data collection and signal optimization along the project routes.
- Real-time CCTV camera images to monitor the state of traffic on the City's roadways and intersections.

Our regional agency partner SANDAG collects data to generate Performance Monitoring Reports. The performance monitoring reports are public information documents and describe

and track the performance of the transportation system throughout San Diego County. The data collection and monitoring is extensive and includes all significant modes for travelers in Chula Vista. The information includes:

- Weekday freeway miles traveled per person.
- Percent of roadways traveled (freeways versus local roads) versus total lane miles (freeways versus local roads).
- Travel by transit – transit, rail, and bus ridership, annual transit boardings, transit use in well served areas.
- Commute mode shares – drive alone mode share, Alternative Transportation Mode share (carpool/vanpool, public transit, walk, bike, telework, other).
- Auto and transit passenger travel times and travel volumes on key corridors.
- Travel delay – hours of traffic delay per traveler, peak period delay during weekends, delay by freeway during commute periods, freeway delay by major corridor per traveler (estimated).

The Quarterly Transit Performance Monitoring Report includes monitoring the efficiency and productivity of transit operating services by service type. These indicators include:

- Operating cost per passenger and per revenue hour.
- Passengers per revenue hour and per revenue mile.
- Revenue hours per employee.
- Farebox recovery rate.

9.2.2 Non-Transportation Data

Chula Vista maintains its excellent quality of life by carefully monitoring threshold standards or "quality of life" indicators for eleven public facility and service topics, including nine city-controlled topics (Air Quality, Drainage, Emergency Response Services, Fiscal, Libraries, Parks and Recreation, Sewer, and Traffic) and two sister agencies (Schools and Water). These topics are identified in the city's Threshold Standards Policy (adopted by City Council in 1987), and each includes a goal, objectives, one or more threshold standards, and implementation measures. They fall into one of three general categories:

1. An established performance standard measuring overall level of service for Drainage, Fire and Emergency Response Services, and Traffic;
2. A ratio of facilities to population is established for Libraries and Parks and Recreation; and
3. A qualitative standard is established for Air Quality, Fiscal, Schools, and Water.

9.3 Existing Data Policy

Existing data is owned by the department that collects it and is shared with other City departments, SANDAG, Caltrans, and the public.

9.4   Information Sharing Agreements

There are existing information sharing agreements across the board between City departments, SANDAG and others agencies/ entities.

10   Engineering Approach

Please see section 5.10 Vision Element #10: Architecture and Standards

10.1   Standards and Architecture

Please see section 5.10 Vision Element #10: Architecture and Standards

10.2   Certification Processes

Chula Vista Smart City will leverage our team's significant participation in and understanding of standards and certification from around the world – with particular use of Qualcomm US work in IEEE 802.11, IEEE 1609 WG, SAE DSRC TC – to ensure that our National Architecture- and CVRIA-compliant and documented architectures are or can be compliant to existing and proposed standards. For proposed standards, our Team will use knowledge and participation in standards bodies to advocate for and develop standards as appropriate.

With regard to certification, team partner Qualcomm has a lead position in the PHY/MAC-oriented Wi-Fi Alliance's DSRC Marketing Task Group and Automotive Market Segment Task Group. This in-depth interaction has enabled us to understand how fundamental over-the-air performance can improve current certification efforts; moreover, it has allowed us to understand the strengths and limitations of the emerging Certification Operating Council. In Chula Vista Smart City, Qualcomm will translate this understanding of the capabilities and gaps of incipient Connected Vehicle certification to focus and mature certification of the applications.

In summary, our team partners have leadership positions in standards development and certification. This positions well to collaborate in all aspects of the familiar standards and certification ecosystem to the benefit of our project approach and to the benefit of Connected Vehicle and Smart Cities deployments in Chula Vista and across the United States.

11   Performance Measures

SCCV will prepare a System Interoperability Test report that will present the results of interoperability testing for all elements within the Smart ecosystem, with quantitative data about the performance of all the subsystems, descriptions of any problems that were encountered, both technical and procedural, and conclusions drawn from these results, with their implications for the Model Deployment. The outline of the report will be developed early in this task, to allow time for review by USDOT, so that the preparation of the report can be completed by the required milestone 20 business days after the completion of these tests.

12   Capacity

SCCV is prepared to demonstrate the Smart City Challenge through our executive commitment, workforce capacity, degree of infrastructure readiness, data and performance management capabilities.

12.1   Executive Commitment

The City of Chula Vista has continuity of committed leadership and capacity to carry out the demonstration throughout the period of performance. This is demonstrated by the strong support from our Mayor and City Council, passing the SCCV Council Resolution unanimously.

12.2   Workforce

The City has assembled a team of experts to guide SCCV through planning work in Phase 1. The City is able to pool from our bench of supporting consultants, including nationally renowned experts in ITS, that will help scope the project effectively. Our lead consultant will be designated in the Tier 1 position on the organizational chart managing all additional team members.

12.3   Infrastructure Readiness

Chula Vista has made exceptional commitments in preparing the City for Smart Growth. The City's infrastructure is diverse and includes all modes necessary to successfully demonstrate the vision and goals of SCCV and the USDOT's 12 Vision Elements.

12.4   Data and Performance Management

Implement result-oriented management, efficient test support and outreach: Smart City Chula Vista has had substantial experience in conducting large scale field operational tests and will apply such experience to the management and support of the Smart City Chula Vista. As the final product of the Challenge will be data, the team will focus on constant monitoring of the field data for data consistency and quality and will provide timely test support to recover system functions should equipment failures occur. Smart City Chula Vista has had great marketing success through its seat wrap in taxi caps, signs on buses, tourist information booths, and partnering with SANDAG through the Fastrak News Letters, etc. Smart City Chula Vista will reach out to residents of Chula Vista as well as to its annual tourist population.

Collect and archive high quality vehicle movement data: The reliable capture of V2V and V2I interaction data is essential for continuing success of the Connected Vehicle program that underpins the Smart Cities initiative. Smart City Chula Vista will propose requirements to enable collection of both smart (integrated) and dumb (HIA) in-vehicle devices.

Adopt and develop tools for data reduction and pre-processing: Various data processing and analysis tools have been developed by UCR-CERT, PATH, and other Smart City partners. This publically funded work will be further enhanced for preprocessing of V2V, V2I, traffic and transit data. Smart City Chula Vista will define data processing needs and develop additional

tools for preprocessing, such as data correlation, mining, filtering, cleaning and reduction, quality monitoring, vehicle trajectories reconstruction from historical data and scenario parsing, etc.

Smart City Chula Vista is confident that our team, the site, the technical approaches and the work plan in this proposal offers the best opportunity for a very successful Smart City Challenge Deployment.

13   Leveraging Funds

Several currently identified, funded, and/ or under construction projects that will be advanced for Smart City Chula Vista include:

- Chula Vista Bayfront Shuttle Service – this downtown circulator service will be advanced to demonstrate frequent autonomous shuttle service transit vehicles. A portion of the route will be dedicated. The City has designated $250,000 for this service.
- South Bay BRT – Phase 1 currently in construction and includes a 12-mile transit line between the Otay Mesa Port of Entry and Downtown San Diego (see Figure 2). The project will include seven stations, a Direct Access Ramp, arterial transit-only lanes (dedicated guideway and bus on shoulder), transit signal priority, and enhanced customer amenities. This phase is estimates $113 million. Numerous deployments will accommodate SCCV criteria.
- Bus On Shoulders – Approximately $10 Million in funding could be designated for the SCCV project.
- Modernized Traffic Management Center - $200,000.