

# City of Kansas City, MO

## Beyond Traffic: The Vision for the Kansas City Smart City Challenge

Part I – Vision Narrative

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# 1. SMART CITY VISION

Smart Cities are at the forefront of the nation’s mind right now, and we have seen an enormous surge in the discussions about the possibilities and benefits of Smart Cities. While there are many similar definitions of the concept in circulation, one that summarizes many of the elements required to make a city or region connected and “smart” is:

*“A city that uses information and communications technology to enhance its livability, workability, and sustainability.” —The Smart Cities Council*

Kansas City, Missouri has truly reinvented itself over the past decade, and now boasts a thriving technical / innovation economic sector, vibrant culinary and performing arts scenes, the historic 18th and Vine district, our renowned parks and boulevard system and, of course, the World Champion Kansas City Royals. These attributes are not all that define Kansas City. In recent years, we have experienced city-wide revitalization due to significant infrastructure improvements including a downtown streetcar, one of the biggest smart city investments in America, and the growth of start-up businesses and commercial businesses as a result. Flyover city no more, Kansas City is the center of the American renaissance. We are the model city to look to for ideas on how to fight crime, get kids reading on grade level, support small entrepreneurs, narrow the digital divide, innovate government processes, and grow the economy in all the right ways.

Cities are at the forefront of change, influencing and touching citizens’ daily lives in a myriad of ways. Transportation is at the heart of it all, driving citizen access to other quality of life amenities. As technology evolves, so too must cities and the transportation infrastructure that weaves a city together. Kansas City, with a population of 459,787, is an ideally sized city to implement next-generation technology in mature and evolving neighborhoods. A smart city is not defined exclusively by technology; rather, it is defined by the way a city eases the lives of its citizens and provides essential services in the most efficient manner possible. From a city perspective, transportation is among the most essential services. Cars are not merely machines, but the means by which a family goes from their home to their schools, to their places of employment, to their doctors’ offices, to visit their parents, and then back home again. In an urban core surrounded by rural communities, the synchronized interaction of busses, streetcars, bicycles, walking paths and freight operations enable citizens to live their lives. In this vein, cities must make transportation safer, easily accessible, more efficient, and user friendly by using advanced technologies that protect our environment.

The existing Smart + Connected City initiative is being driven by a partnership with Cisco, Sprint, and others to enhance internet availability, energy savings, new revenue streams, and improve connectivity with citizens, including efforts to bridge the “digital divide.” The initiative will attract technology startups from across the globe to test their concepts here as KCMO becomes an open data “Living Lab.” The changes are happening first along the 2.2-mile downtown streetcar line and will change the way the city works – from more efficient management of infrastructure like traffic signals, streetlights, and storm water systems to new ways to engage with residents and visitors.

Kansas City, MO is doing just that. Building upon our existing smart city infrastructure and open data systems, expansive highway and roadway system, existing placemaking and digital inclusion efforts, our vision focuses on using technology and establishing metrics that will directly impact neighborhoods. We will begin in those that need impactful infrastructure improvements the most. Neighborhoods east of Troost, a street that has historically divided socioeconomic classes in our city (i.e. the “East Side”), especially need these investments.

Unemployment, poverty, and crime rates are disproportionately higher in this area. The Beyond Traffic grant would provide a means for these neighborhoods to access WiFi and the Internet, develop better cost/time efficient transportation, and increase economic development. As a result, Kansas Citians will get to their jobs faster, easier and more cheaply. Residents will have greater access to educational, employment, dietary and health care opportunities, and citizens will live in safer, cleaner and better connected communities.

Kansas City is implementing cutting edge smart cities technologies and preparing for what's next. Autonomous vehicles, currently designated as the "car of tomorrow," will be better positioned in a city that is preparing for it today. Three important factors directly support these efforts:

(1) Kansas City has 319 square miles within its boundaries and almost 8,000 square miles in the metropolitan area; we maintain the most highway miles in the region and manage the interstate system from the Colorado/Kansas border to the outskirts of Saint Louis

(2) Kansas City has the most established infrastructure of fiber and WiFi in the United States; we were the first Google Fiber city and were recently lauded by HUD Secretary Castro

(3) Kansas City hosts two major car manufacturing facilities; we are a conveniently located test bed for automobile industry R&D activities.

Finally, it is important that we continue to make our current transportation as connected and robust as possible. We propose several initiatives that enhance our recent investments, including better use of bike sharing through road diets, and an app for Kansas City residents and visitors to provide clear and simple wayfinding. Our approach combines new technology (i.e. connected / autonomous vehicles, and smart city sensors) with existing transportation infrastructure, and it results in a system that generates a positive impact much greater than the sum of its parts.

Kansas City will meet the Smart City Challenge with three interconnected efforts, which we refer to as our "pillars." These pillars will enable us to develop, validate, and deploy elements of a 22nd Century transportation system that can evolve as technologies continue to develop. The three pillars include:

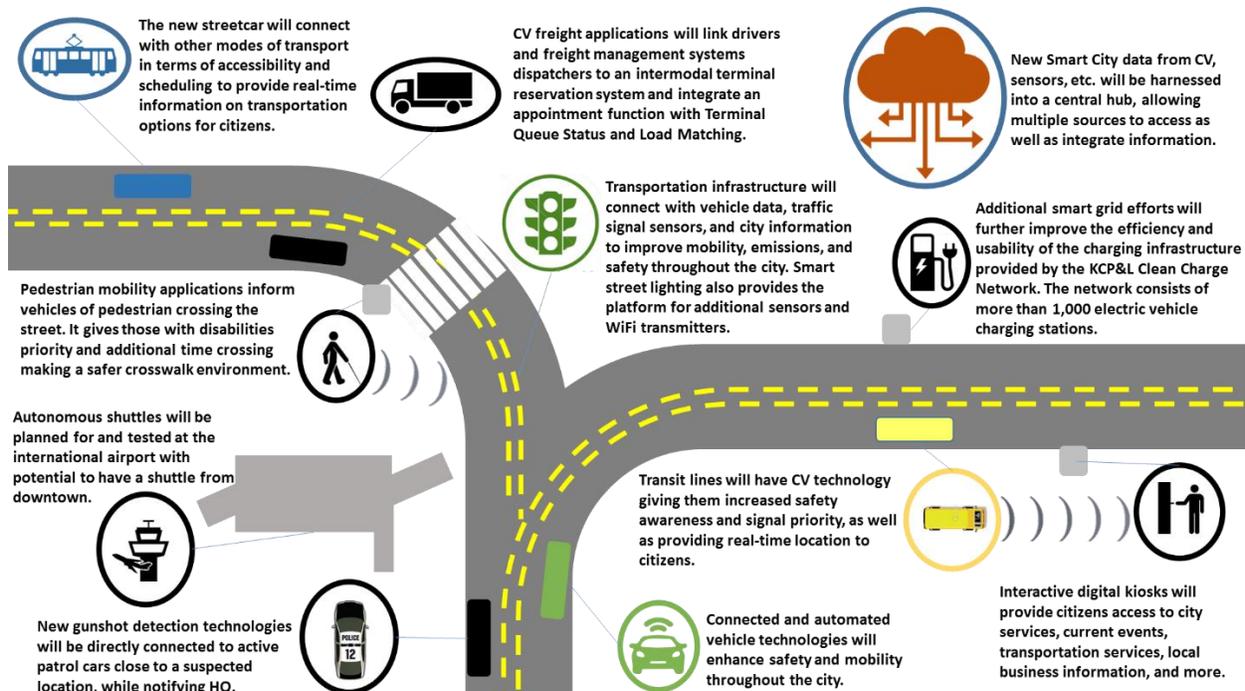
- 1) Deploying East Side Transportation and Connectivity Solutions
- 2) Increasing Key Corridor Safety through Connected and Autonomous Vehicles
- 3) Increased Mobility and Accessibility through Information Sharing

The three pillars will result in improved quality of life in East Side neighborhoods, decreased congestion in key transportation corridors, increased safety throughout the transportation system, provide transportation system and connectivity access to all sectors of the city's population, reduced negative environmental impacts, integrated city-wide infrastructure and systems, and move the development and economic vitality of the region into its next phase of evolution. Each pillar in our concept is described below, all three of which will be integrated to provide city-wide improvement of transportation systems in a Smart City environment. These efforts will complement those already underway in the Kansas City Smart + Connected City initiative.

Kansas City's extensive open data capability, resident in the City's Office of Performance Management, is a first-of-its-kind data collection and analysis approach. New data from the current Smart + Connected City initiative is collected through Sensity and Cisco platforms beginning in March/April 2016 and will add to a robust, existing open data system. The city serves as the major regional economic engine, affecting both the states of Kansas and Missouri. The Kansas City area represents 38% of the gross domestic product of the state of Missouri's eight metropolitan areas, and the city's metropolitan area generates Kansas' largest GDP. Multiple state jurisdictions in the region require complex maintenance planning and synchronization efforts, but can also take advantage of more available funding and a greater spectrum of ideas to solve challenges.

Our three pillars include attention to key areas of the city that address the USDOT's vision elements and the building blocks for continued development of a comprehensive Smart City solution. The deployments described in our pillars will result in both short- and longer-term positive impacts. As the city becomes more accessible and connected, we will be positioned and able to integrate additional data and analyses, communications systems, and overall more intelligent solutions with other critical infrastructure and city-wide systems, including the energy and utility sectors, health options and solutions, and even education.

**Figure 1-1: Kansas City Smart City Vision**



### **Pillar 1: East Side Transportation and Connectivity Solutions**

Neighborhoods on the east side of Kansas City are in need of digitization in order to help advance the economic and social environment for underserved segments of the population, and to address public safety concerns inhibiting growth and opportunity. This first pillar of our Smart City concept focuses on transforming the eastern third of the city along Prospect Ave. The population in this area is highly dependent on public transportation and cellular phone-based digital connectivity. Average incomes are below regional averages and unemployment rates are high. Crime rates are higher in this area and economic development efforts continue to serve a population of citizens with a high rate of poverty.

Our East Side Transportation and Connectivity Solutions will focus development along an existing eight-mile bus line and bus rapid transit line that is slated to begin operations in 2018 by the City and Kansas City Area Transportation Authority (KCATA). This line runs on Prospect Ave bounded on the north by the Jazz District at 18<sup>th</sup> and Vine and on the south by the Marlborough Neighborhood and AlphaPointe, a comprehensive rehabilitation and education agency for people with vision loss providing outreach, services, employment and education and is the third largest single employer of visually impaired individuals in the United States. Our concept in this area will increase safety, mobility services, accessibility to the visually impaired, and

employment resources and opportunities along the Prospect Ave corridor via WiFi, connectivity, and additional transportation options. These efforts will result in an Initial Digital Infrastructure, or “Information Superhighway” that will enable citizens to meet and lead the rest of the city in terms of access and involvement in new economic models and activity. In addition, the digital access and supporting education and training programs that will accompany the digital expansion and improvement of the transportation system will catapult the area, and by extension the city, to be a forward-looking community rooted in new technology skills and access. Specifically, the efforts in this pillar will:

***Increase safety by integrating new technologies*** such as new gunshot detection technologies connected directly to active patrol cars close to a suspected location, while notifying HQ. The results of the detection technology will be reviewed and analyzed in real time and integrated into the City Infrastructure Management (CIM) Platform. We will expand the current deployment of Sensity smart lighting and video sensor technology in the downtown area to this corridor, enabling a multitude of other solutions and insights that will increase safety. We will also consider the deployment of smart pavement that has sensors and embedded lights that further illuminate the environment. Deployment of Connected Vehicle (CV) applications such as Vehicle Turning Right in Front of Transit Vehicle and Pedestrian in Signalized Crosswalk will also improve the safety of transit riders, cyclists, and pedestrians.

***Increase mobility services*** by implementing dynamic ridesharing opportunities, additional bike share stations, vehicle share stations, and digital sensors on both bus stop shelters and buses. Data collected from these sensors will help support efficient movement of traffic, identify requirements for dynamic tasking of buses or other public transportation assets, and improve responsiveness of public safety resources. Kansas City will also utilize CV applications such as Transit Signal Priority to improve bus route efficiency. Interactive transit stations will provide real-time trip planning and arrival displays with information on multi-modal connections throughout the corridor.

***Increase accessibility to the visually impaired*** by implementing CV applications such as Route ID for the Visually Impaired to assist them with the identification of the appropriate bus and route to their intended destination, transit stop navigation and audible signage, safe pedestrian crossings, and Remote Infrared Audible Signage (RIAS) technology consisting of infrared transmitters repeatedly sending encoded spoken versions of the contents of signage through wireless communication.

***Increase employment resources and opportunities*** by including public WiFi along the entire transit corridor as well as on the entire KCATA bus fleet (April 2016) to provide an interactive service for citizens within the corridor and wayfinding applications that support citizens’ information requirements in real time including job search, education, transportation options, and support functions.

## **Pillar 2: Increasing Key Corridor Safety through Connected and Autonomous Vehicles**

The second pillar to our Smart City concept is focused on deploying both connected vehicle (CV) and automated vehicle (AV) technologies within multiple areas of the city, including on a corridor from the airport to downtown, and along the I-70 highway. In addition to many of the positive safety, mobility, and environmental impacts that are often at the center of CV and AV deployments, our vision also focuses on the interaction between people using automobiles as their primary transportation resource and the community.

The goal of this pillar of the Smart City Challenge is to improve passenger safety, increase efficiency across the highway networks, and validate the optimal experience for the operator of a smart and connected vehicle. Applications that can be tested in this effort include traffic direction or management systems, accident

mitigation prioritization, and direct advertising that addresses an individual's needs along with additional applications that will naturally develop through Kansas City's Living Lab. Kansas City also plans to expand the planned one-mile "road to tomorrow" pilot into connective tissue that links thousands of commuters throughout the region and validates a realistic scenario that can be replicated by other cities.

Existing regional infrastructure and development efforts, including midtown sensors managed by the city, regional sensors distributed over an 8,000 mile regional network managed by KC Scout (joint TMC operated by the Missouri and Kansas Departments of Transportation), data from the region's transit fleets, and ongoing efforts to construct a "smart highway" on I-70 within the city limits, provide the elements upon which to build to create an living laboratory to address the multiple challenges that commuters face daily.

Beginning in regulated spaces like the airport property or in bus lanes, Kansas City citizens are ready to ride in autonomous vehicles today. The grant will provide us with additional opportunities to expand and deploy the technologies in these areas. CVs and AVs will keep passengers connected to directional or site-specific information, inform passengers about traffic issues or local events, and keep passengers safe. Kansas City will build on the findings from initial CV and AV studies by incrementally integrating these vehicles into traffic. Close collaboration between automobile manufacturers, analytics firms based in Kansas City, and universities will pave the way for future implementation in similarly sized and larger cities.

Our deployment of new technologies along the I-70 corridor will also address some of our freight challenges. Current efforts to address freight challenges include:

- Smart technologies in use by the major railroad corporations operating under the umbrella of the Kansas City Terminal Railway
- Establishment of a SmartPort, integrating multi-modal operations and is beginning to add barge operations on the Missouri River

<p style="text-align: center;"><b>Kansas City Freight Landscape</b></p> <ul style="list-style-type: none"><li>• The largest rail freight traffic (by tonnage) hub in the United States</li><li>• The third largest trucking hub in the country</li><li>• Houses four multi-modal logistics hubs providing the full range of transportation services</li></ul>
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Building off our current efforts, we will develop additional analyses to understand where the need for new technologies exist, as well as targeted plans and processes that will integrate new technologies and data management techniques in order to further improve efficiencies in freight management operations. These efforts will also have a downstream impact on the economic well-being of the region, reduce pollution associated with the transportation industry and large numbers of freight movers, and improve worker safety for all the firms involved in these operations.

**Pillar 3: Information Sharing and Increased Mobility/Accessibility**

Our third pillar of the concept is to increase the connectivity and information sharing by advancing the steps already made for new transportation options and technologies with the 2.2 mile streetcar starter line, slated to begin operation in April 2016. While there is already construction underway to build the streetcar, we will build upon this momentum to add connectivity, integrate the streetcar with other modes in terms of accessibility and scheduling, thus connecting new areas, increasing public transport options, and bringing in new technologies and connectivity to citizens throughout the city. Our current efforts to expand public WiFi, put in place digital information kiosks, increase speedy movement throughout the downtown along the new

streetcar line, and deploy related applications will be increased and expanded to include more connectivity and integration to multiple city systems.

The current Smart + Connected City effort includes select smart streetlights with video sensors to detect blockages on the street car line and improve safety, as well as twenty-five kiosks that provide citizens the opportunity to learn about nearby activities, interact with the city through messaging formats, or obtain knowledge about city services if they have no smart phone. For the Smart City Challenge, we will integrate the findings from the data received through the sensors and videos, as well as kiosks, with the other information from data across the city's improved transportation systems.

**Connectivity and services**

- We will collaborate with crowd sourcing companies like Bridj, Uber, and bike and car sharing organizations to offer an array of mobility services.
- We will work with Kansas City Power & Light to make the existing electric vehicle charging network more useable and efficient.
- We will implement road diets to redesign select roads/corridors to offer citizens more opportunities for safe biking and walking.

As Kansas City moves into the world of “Big Data” we will continue to make data open and available to the public and entrepreneurs to develop innovative applications that benefit the local government and citizens. The city will develop additional capabilities beyond the Smart City grant based on data collected by sensors. Possibilities range from dynamic tasking of public transportation assets based on population movement, to focused application of public safety resources based on sensor data, to decreasing congestion due to interconnected traffic lights, and increasing availability of non-vehicle traffic.

## 2. POPULATION CHARACTERISTICS OF KANSAS CITY

Kansas City, MO meets the population characteristics set for the ideal Smart City.

- KCMO is a mid-sized city with a **Census-Designated Place (CDP) population of 459,787** in the 2010 Census data
- KCMO has a population density of **1,460 people per square mile**
- KCMO CDP population represents **29.75% of the Census Urbanized Area (UZA) population**

**Table 2-1: Age, 2010 Census**

Age Group	Population	Percentage of Total	Percentage of Total
<b>Under 18</b>	111,058	24.2	34.2
<b>18 – 24</b>	45,913	10	
<b>25 – 34</b>	75,490	16.4	36.7
<b>35 – 49</b>	93,523	20.3	
<b>50 – 64</b>	83,097	18.1	29.1
<b>65 and over</b>	50,706	11	

As exhibited in Table 2-1, **over a third of the population is under the age of 25, while close to a third of the population is over 50.** In the metropolitan area, the aging population is more prevalent. The younger population has been slower than its predecessors to acquire drivers' licenses and buy cars and single-family housing. If these preferences persist, we will need to change our current perspectives on regional travel behavior. To the transportation disadvantaged (which includes the aging population), public transit is particularly important. The U.S. Census defines transportation-disadvantaged populations as adults age 65

and older, people with low incomes, people with disabilities, and those who don't own a car (even if by choice) and would therefore be vulnerable in an emergency.

**Table 2-2: Income, 2010 – 2014 Census**

Income Characteristic	Value	U.S. Average
Per Capita Income	\$27,282	\$28,555
Median Household Income	\$45,376	\$53,482
Persons Below Poverty Level	19.4%	14.8%

Note: Most persons below the poverty level reside in the eastern area of the city which is primarily populated by minorities (about 45% of the city population).

The **2014 population estimate** shows a **2.4% increase to 470,800**. **KCMO population centers** are located in the north, east, and south areas of the city. The greater downtown area is located in western/central Kansas City. While this area houses many businesses and recreational areas, population density is low. KCMO has focused redevelopment and reinvestment in the downtown area, with efforts such as the streetcar project and corridors with the potential for high capacity transit improvements. Kansas City forecasts a significant population increase at a higher population density as a result of this development. Within three miles of the center of the central business district, Kansas City saw an increase in millennials of 63% in the past 12 years, which is impressive compared to peer cities. While the Smart City initiatives will help provide accessibility and equity to disadvantaged populations, it will also attract companies and jobs to help overall economic growth.

### 3. KANSAS CITY CHARACTERISTICS

Kansas City is nationally recognized as a hub for civic innovation. Leadership is demonstrated by the ongoing renovation of Downtown, construction of a modern streetcar system, rapidly evolving arts scene, green infrastructure investments, and ground-breaking smart city technologies. Kansas City's technology initiatives are a catalyst for connecting communities and fostering economic development.

**Table 3-1: Characteristics which Define Kansas City as a Digital Leader**

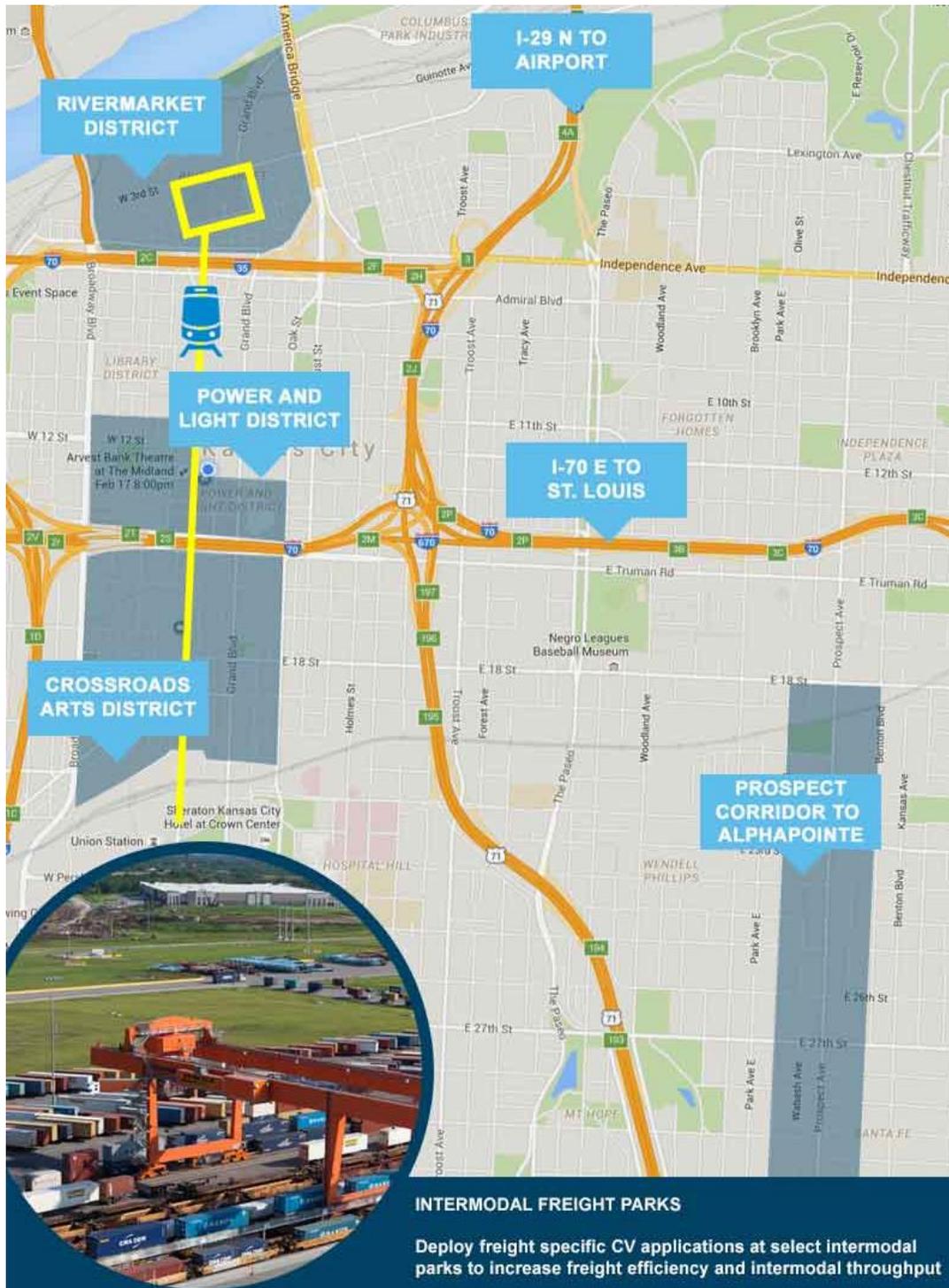
Kansas City Characteristic	Detail
<b>Existing Public Transportation System</b>	<ul style="list-style-type: none"> <li>● Kansas City Area Transportation Authority: Metro Area Express (MAX)               <ul style="list-style-type: none"> <li>○ Main St. MAX links River Market, Downtown, Union Station, Crown Center, and Plaza</li> <li>○ Troost MAX links Downtown, Crossroads, Hospital Hill and UMKC Campus, Discovery Center, Stowers Institute, Rockhurst University, Research Medical Brookside Campus, Swope Health Services South, Bannister Federal Complex and Cerner Complex</li> <li>○ Features GPS tracking, transit signal priority and dedicated bus lanes</li> <li>○ Kansas City's metro sits over two states where four major interstate highways intersect</li> </ul> </li> <li>● Modern Streetcar System               <ul style="list-style-type: none"> <li>○ Beginning Spring 2016: will run between River Market &amp; Union Station</li> </ul> </li> </ul>
<b>KC Provides an Environment Conducive to Proposed Strategies</b>	<ul style="list-style-type: none"> <li>● Digital Roadmap is Kansas City's plan for a digital future; roadmap components: digital inclusion, open government, engagement, industry, and smart city – additional information within Chapter 10: Goals and Objectives</li> <li>● Kansas City is one of five IEEE Smart Cities and will host the 2017 International IEEE Smart Cities Conference</li> <li>● Cisco Smart + Connected Community</li> </ul>

	<ul style="list-style-type: none"> <li>o Will provide public- Wi-Fi, integrating LED street lighting with video sensor technology, and interactive community kiosks</li> </ul>
<b>Robust Five Year Business Plan</b>	<ul style="list-style-type: none"> <li>● Presents goals to guide the budget process and ensure clear priorities</li> <li>● Priorities include: Customer Service, Finance and Governance, Infrastructure and Transportation, Neighborhoods and Healthy Communities, Planning, Zoning, and Economic Development, and Public Safety</li> </ul>
<b>Continuity in Committed Leadership</b>	<ul style="list-style-type: none"> <li>● Mayor Sly James was re-elected in June 2015; established a Smart City Advisory Board to manage collaboration and technology implementation</li> <li>● City Manager Troy Schulte, contract extended January 2016</li> <li>● Many committed organizations in the area as seen by the attached commitment letters</li> </ul>
<b>Commitment to Integrating with Sharing Economy</b>	<ul style="list-style-type: none"> <li>● Living Lab <ul style="list-style-type: none"> <li>o Cisco/Think Big Partners joint proposal-allows entrepreneurs to build high growth firms</li> </ul> </li> <li>● Partnership with University of Missouri System: UMKC committed to support Smart Cities concepts through the Law School, Business School and Innovation Center</li> </ul>
<b>Commitment to Making Data Accessible to the Public and to Fuel Entrepreneurship</b>	<ul style="list-style-type: none"> <li>● The public can access the following data on the KC Open Data Portal and KCStat: <ul style="list-style-type: none"> <li>o Severe weather warnings, upcoming events, building and sanitation data</li> <li>o City progress toward City Strategic Plan objectives and budget adjustments</li> <li>o Kansas City has active community engagement events, such as Kinetic, which are community conversations on the future of transportation</li> </ul> </li> </ul>
<b>Kansas City is home to several government and commercial facilities</b>	<ul style="list-style-type: none"> <li>● Regional Headquarters for the Federal Aviation Administration and the Federal Transit Administration, an Internal Revenue Service facility, GSA facility, USDA facility, Sprint Center, Federal Reserve Bank, and it is the first city to receive Google Fiber</li> </ul>
<b>KC Digital Drive</b>	<ul style="list-style-type: none"> <li>● Non-Profit Organization whose mission is to make KC a digital leader to secure economic prosperity and improve the quality of life for the region</li> </ul>

# 4. ANNOTATED PRELIMINARY SITE MAP

Kansas City will focus efforts on the Prospect Ave, Streetcar, and I-70 corridors, along with intermodal freight parks. Kansas City will also plan and test autonomous airport shuttles with a potential shuttle from downtown.

Figure 4-1: Kansas City Smart City Challenge Preliminary Site Map



## 5. SMART CITY INTEGRATED APPROACH

The three pillars of Kansas City’s Smart City concept address the twelve vision elements outlined by the USDOT in this solicitation. We have included a table with cross references, and include more detailed discussions of each element and how our pillars will address these needs.

**Table 5-1: Pillars Aligned to Smart City Vision Elements**

Pillar	Urban Automation	Connected Vehicles	Intelligent, Sensor-based Infrastructure	Urban Analytics	User-Focused Mobility Services and Choices	Urban Delivery and Logistics	Strategic Business Models and Partnering Opportunities	Smart Grid, Roadway Electrification, and Electric Vehicles	Connected, Involved Citizens	Architecture and Standards	Low-cost, Efficient, Secure, and Resilient ICT	Smart Land Use
1) East Side		◆	◆	◆	◆		◆		◆	◆	◆	◆
2) Key Corridors	◆	◆	◆	◆	◆	◆	◆			◆	◆	
3) Information		◆	◆	◆	◆		◆	◆	◆	◆	◆	◆

### 5.1 Vision Element #1: Urban Automation

Embedded in our concept for Pillar 2 is the vision that automated vehicle (AV) technology will eventually take full advantage of smart city infrastructure and data to improve performance, resulting in faster, safer, and environmental-friendly transportation. For instance, AVs will connect to data sources such as KC Scout, KCATA to analyze signal timing and traffic patterns; sporting events and concerts; and other city activities that may cause traffic congestion. Automated vehicles will incorporate this information into travel routes and low level vehicle actuation controls, reducing travel time and fuel consumption. While these are longer term goals, the Smart City Challenge will focus on extending current driverless vehicle testing and pilots at the airport and greater downtown districts.

The MO House Bill (HB) 924 currently allows testing of driverless motor vehicles until August 28, 2018. As part of the Smart City Challenge, we will reintroduce a bill to extend testing. To promote automation development, Kansas City will begin testing in regulated spaces such as the Airport property and bus lanes. The city will also develop test bed like-environments in areas where there is existing infrastructure, including downtown and the Power and Light District. The greater downtown districts will benefit from the deployment of a smaller automated shuttle connecting the streetcar and KCATA stations or popular museums and parks, thereby improving mobility and safety.

Automated systems will augment existing transit options and be connected with one another resulting in shorter wait times. With the Smart City grant, we will begin plans and tests for deployment of an autonomous shuttle from Kansas City International Airport to the downtown. The longer term vision is that this shuttle will be connected to the flight schedules allowing it to align its route timing to the flights departing and arriving that day, reducing cost and vehicle emissions. The first steps to deploying such a shuttle will be a central part of our Smart City technology investments, focusing on localized autonomous vehicle demonstrations and planning for full deployment.

Other elements of our pilot activities that will include automation are the development of applications that can address the needs of disabled riders, such as those with visual impairments, and integration of information to other parts of the transportation system.

## 5.2 Vision Element #2: Connected Vehicles

Pillars 1, 2, and 3 of our concept include identifying, using, and analyzing CV data from Smart City Challenge CV participants, public vehicles, and freight vehicles from partners to combine with existing KC Scout, KCATA, and Operation Green Light. These combined data sets will be utilized to facilitate smart travel throughout the city. Kansas City will benefit from eight CV applications, five vehicle to infrastructure (V2I) and three vehicle to vehicle (V2V), deployed throughout our target areas. Applications are shown in Table 5-2.

**Table 5-2: Smart City Challenge Connected Vehicle Applications**

Impact	Applications
	<b>V2I</b> <b>Intelligent Traffic Signal System (ISIG)</b> application adjusts signal timing for an intersection or group of intersections to improve traffic flow, including vehicle platooning through intersections. When connected with real-time city data, including information about special events such as concerts at the Kauffman Center or athletic games at the Sprint Center, signal timing could be tailored to effectively manage traffic flows within the city.
	<b>V2I</b> <b>Transit Signal Priority</b> application will incorporate connected vehicle technologies to Kansas City's Transit systems. Buses will be able to request priority at intersections to increase schedule reliability and reduce time spent stopped at a red lights, thus reducing emissions.
	<b>V2I</b> <b>Pedestrian Mobility</b> application will provide information to pedestrians and vehicles at crosswalks and intersections. Mobile devices will inform pedestrians when to cross as well as warn people and vehicles of possible infringement while crossing. This application will also give those with disabilities priority and additional time crossing making a safer crosswalk environment.
	<b>V2I</b> <b>Route ID for the Visually Impaired (RVI)</b> will be integrated in transit systems to aid the visually impaired. Buses and other transit systems, like the new streetcar, will assist the visually impaired with identifying appropriate buses and routes by issuing information and notifications from bus stop infrastructure to portable devices.
	<b>V2I</b> <b>Railroad Crossing Violation Warning (RCVW)</b> application will alert and/or warn drivers who are approaching an at-grade railroad crossing if they are on a crash-imminent trajectory to collide with a crossing or approaching train. RCVW will be developed areas that surround the Amtrak station and intermodal rail terminals located at the northern part of the city.
	<b>V2V</b> <b>Emergency Electronic Brake Light (EEBL)</b> application enables vehicles to broadcast their emergency brake event to surrounding vehicles and provide a warning to the driver.
	<b>V2V</b> <b>The Forward Collision Warning (FCW)</b> application warns drivers if there is an impending rear-end collision ahead in traffic in the same lane as the travel.
	<b>V2V</b> <b>The Intersection Movement Assist (IMA)</b> application warns drivers when it is not safe to enter an intersection due to high collision probability with other vehicles.

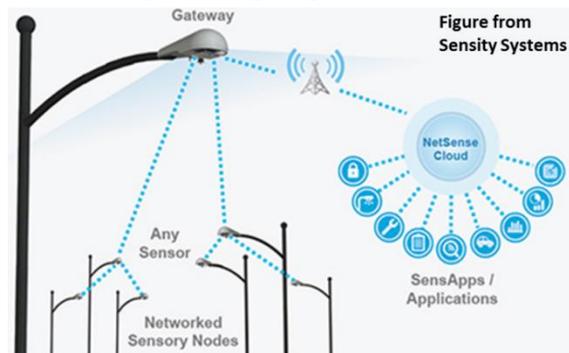
## 5.3 Vision Element #3: Intelligent, Sensor-Based Infrastructure

All three pillars in our concept will include deployment of intelligent, sensor-based infrastructure that will facilitate the ability to react in real-time to factors that affect transportation and public services. Kansas City is already managing traffic in the area through KC Scout, a bi-state transportation management system that uses cameras, sensors, and traveler information tools (i.e., electronic message boards, highway advisory radios, website, and phone applications) to manage operations and disseminate information. We will plan and deploy key connected infrastructure elements throughout our focus areas in order to facilitate addressing our three pillars.

Kansas City is a partner with MARC in Operation Green Light (OGL), a multi-jurisdictional system that coordinates more than 700 traffic signals throughout the region, including the Prospect MAX corridor. OGL currently provides pre-timed synchronization of traffic signals for peak commuter periods and special events. A majority of the traffic signals in the OGL network can also support adaptive signal-control systems that provide real-time optimization of traffic signals, adjusting signal timing based on prevailing traffic conditions, demand and system capacity. We will fully integrate all traffic signals within Kansas City to OGL, which will reduce congestion, leading to fewer CO2 emissions, and roadway delays for the traveling public. A fully integrated traffic signal network will give real-time traffic signal information to traffic and transit applications. We will also incorporate this information to proposed connected vehicle technologies, which will further reduce traffic and fuel emissions. Connected vehicles will be able to recommend speeds helping drivers time green lights potentially allowing them pass through entire corridors without stopping.

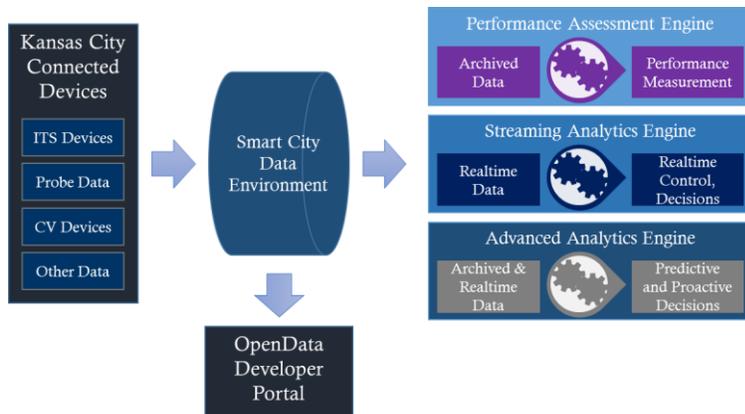
The city will deploy widespread use of sensors with video technology at multi modal transportation access points. Bus stop sensors will be able to identify an increased number of people waiting at a stop. This information will be sent to buses on that route giving them the ability to adjust their routes to make additional stops where there are more people or skip a stop if no one is there. Sensors on bike share stands will identify how many bikes are available in a specific location. This information will then be sent to users for selection of available bikes as well as bike share companies helping them effectively restock bicycles stands.

The current Smart + Connected Kansas City initiative includes Sensity smart lighting and sensor solutions throughout the city (with many already deployed) utilizing the WiFi network powered by Sprint. This technology will be extended to the Prospect Ave Corridor to help improve WiFi accessibility and safety. Additional WiFi access will be available through other providers who are developing and employing economically sound repeaters based on available resources. Kansas City will consider adding air quality sensors to smart streetlights to better measure the improvements of smart city technology on the environment and feed urban analytics applications.



#### 5.4 Vision Element #4: Urban Analytics

Kansas City's Smart City concept, across all three pillars will produce, transmit, and use significant amounts of data that will be leveraged to solve complex transportation issues. The Kansas City Office of Performance Management already uses urban analytics to analyze data for the city and update performance metric dashboards such as KCStat. Kansas City will work with partners such as KC Scout, KCATA, and Kansas City Power & Light to layer archived data on vehicle and traffic patterns with other external data factors like road weather, energy usage, and accident reports to develop probabilistic analytics that will prevent future travel incidents. Maintenance and construction crews will be able to use this information to work at ideal times, which will reduce mobility and safety concerns.



To further identify traffic and transportation demands, Kansas City will develop a real-time pricing analytic tool. The tool will incorporate pricing from existing traffic data, electric usage, and parking spots with online payment systems to give real-time and predictive traffic demands. This information will be used to help citizens efficiently and effectively travel throughout the city. Predictive information from real-time pricing as well as other types of

transportation data can advise a traveler when and how they should travel at any given time. For instance, the system will inform a person that if they left for work on Wednesdays 15 minutes later than their usual departure time due to traffic congestion, they would avoid traffic delays and arrive at the office at the normal time. This information will also be used to advise the most effective types of transportation for a specific travel time and day, especially along the key corridors identified for the challenge – Prospect Ave, I-70, and streetcar.

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

Kansas City's Smart City concept is in great part, across all three pillars, focused on improving mobility services and choices. The city has the greatest number of highway miles per resident in the country, most likely due to ease of access and culture of use, creating a dependency on automobiles. The smart city pilot will allow Kansas City to shift some of the dependence on individual vehicles, by offering an array of mobility services that promote transit usage. KCATA is currently working with the ride-hailing company, Bridj (a commuter shuttle service that allows passengers to request shuttle rides through a mobile-phone application), to develop plans for new services such as a pilot program slated to begin in March 2016. Kansas City will continue to engage ride-hailing companies to develop new services and transportation options.



Image from Bridj

Our Smart City pilot will also include an option for citizens to access other types of transportation like Kansas City B-cycle, a bike share program through new applications. Kansas City's kiosks will be able to aggregate multiple lines of mobility services and tell citizens which modes of transportation are located nearest to them as well as consider the most effective way of travel. If the roads are congested, a traveler information system may advise that a bicycle is the most efficient way of travel.

Kansas City's Open Data portal gives the general public access to Kansas City data (budget information, statistics, sanitation and building data, transportation data, city maps, etc.). The Open Data portal promotes innovation and helps develop data driven technologies that will be incorporated in our Smart City vision. One concept that will harness city data is a mobile payment system integrated with several transportation services. This application will allow citizens to conveniently pay for multiple channels of transportation from one source. We also propose creating a smart phone application that will communicate with beacons on road-side infrastructure to provide contextual information and routing to the visually impaired to meet the challenge of

independent travel for the visually impaired. Involvement from the Innovation Partnership Program (an initiative for entrepreneurs to apply to develop, test and demonstrate innovative solutions with KCMO data and infrastructure) will offer collaborative efforts, which will enhance application development.

## 5.6 Vision Element #6: Urban Delivery and Logistics

Included in our improvement of key corridors concept, Pillar 2, new technologies will impact the urban delivery and logistics element. The Kansas City region is one of the nation's leading freight hubs, with infrastructure that supports goods movement by truck, rail, air, and water for domestic and international trade. The Mid-America Regional Council (MARC) engages the freight industry through a standing Goods Movement Committee and is in partnership with Kansas City SmartPort, an organization focused on promoting regional freight and logistics. Major intermodal centers to transfer freight containers between trucks and rail are being developed at the 1300-acre Center-Point-KCS Intermodal Center in Kansas City, the 450-acre Northland Park, and the 1000-acre Logistics Park Kansas City in its suburb of Edgerton, Kansas. The 800-acre KCI Intermodal Business Centre will handle transfer between trucks and aircraft.

Kansas City will help improve efficiency through implementing and promoting the use of Freight Advanced Traveler Information Systems (FRATIS) mobility applications, such as Freight Drayage Optimization and Freight-Specific Dynamic Travel Planning, at select freight hubs and intermodal facilities. These applications combine load matching and freight information exchange systems to optimize operations. It will link drivers and freight management systems dispatchers to an intermodal terminal reservation system and integrate an appointment function with Terminal Queue Status and Load Matching. These applications include the traveler information, dynamic routing, and performance monitoring aspects for freight-truck operations and leverage existing public data, as well as emerging private sector data. While the truck parking is effectively managed by the large intermodal parks, parking is a challenging consideration downtown. Kansas City will promote off-hours/over-night delivery downtown and other areas of the city that have limited space for truck parking.

### **Kansas City Freight Characteristics**

- In 2014, the transportation system handled an estimated 264 million tons of freight with an estimated total value of \$357 billion
- Largest rail freight traffic hub in the United States - carries over 300 daily arrivals and departures
- Third largest trucking hub in the country – intersection of four of major interstate highways (I-35, I-70, I-29, and I-49)
- Airport moves more air cargo each year than any air center in a six-state region
- Located on the largest navigable inland waterway

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

Kansas City's vision for deploying new Smart City technologies across our three pillars is reliant on effective relationships and partnerships. We have already assembled a multi-dimensional team and are actively in discussions with other partners. Smart City integrated efforts are best implemented with a combination of private, non-profit, academic, government, and other agency cooperation. Kansas City plans to develop a Smart City Challenge Management subcommittee to the existing Kansas City Smart City Advisory Board. The Kansas City Office of Innovation would maintain administrative oversight of the challenge while the subcommittee would manage operational oversight. Section 7, Team Partners, describes our current and potential partners.

Critical to developing strong and valuable partners with a diverse set of public agencies, private industry, academia, various trade associations, and non-profit organizations is gathering feedback on insights, needs, and concerns with any Smart City plans. The Kansas City team will develop and implement a stakeholder outreach plan during the first phase of the Smart City Challenge grant. We will develop a comprehensive list of stakeholder groups to connect with, and search for and secure opportunities to conduct listening and feedback sessions to understand the needs of the community and ensure that they are attended to during our planning and deployment process. Consistent and regular communications throughout the project will ensure that we maintain strong relationships and take advantage of all potential partnership opportunities.

In addition, we will call on the expertise of our partners in developing new effective models to ensure cross-organization collaboration to leverage the best ideas and expertise across any relevant organizations. Examples of these kinds of models include P3s, subcontractor agreements, and strategic alliances. Many of our team members are already involved in these arrangements, as is the city with private companies and other government agencies. Within the region, we are well versed at collaborating across government agencies, based on our dual-state location and our established civic, community, and government organizations standing working groups and projects. The Kansas City area currently hosts Kansas City Digital Drive, a bi-state non-profit organization committed to best employing digital technology to impact citizen experiences in both digitally rich and digitally poor neighborhoods. ConnectHome, a collaborative team featuring technology experts from both Kansas and Missouri, is providing computers and training for underserved populations. Kansas and Missouri also collaborate effectively in traffic control through KC Scout, which manages traffic flow across both sides of the state line and executes Operation Greenlight.

Kansas City is also committed to forging connections with other federal agencies in applicable areas, such as energy and utilities, rail and freight operations, and health and education systems. Booz Allen Hamilton, one of our partners, has a long history of working across all federal agencies and is already involved in Smart City efforts with many agencies, which we will explore for potential involvement and connections to our deployment.

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

Kansas City is now one of the best places to own an electric vehicle as a result of the charging infrastructure provided by the Kansas City Power & Light (KCP&L) Clean Charge Network. The network consists of more than 1,000 electric vehicle charging stations, more than any other U.S. city, and is free to use for the first two years. KCP&L is also demonstrating an end-to-end SmartGrid—built around a major SmartSubstation—that includes advanced generation, distribution, and customer technologies.

Co-located renewable energy sources, such as solar and other parallel generation, will feed into the energy grid. The demonstration area consists of two square miles with 14,000 commercial and residential customers. Part of the demonstration area contains the Green Impact Zone, 150 inner-city blocks that suffers from high levels of unemployment, poverty, and crime. The SmartGrid program will provide area businesses and



residents with enhanced reliability and efficiency through real-time information about electricity supply and demand.

Kansas City will work with KCP&L to incorporate electric vehicle smart grid technologies into their current Smart Grid capabilities. These technologies will enable the grid to interact with electric vehicles in the home to charge at the most optimal time (usually early morning) while still assuring a fully charge. For vehicles using public charging stations, these technologies will enable the vehicle to identify itself to the charging station where the electricity cost can be automatically billed to the user – similar to using an EZPass on a toll road. Kansas City will also coordinate with KCP&L to evaluate possible areas or corridors to consider developing roadway electrification capabilities by analyzing data on electric vehicle use and charging.

### 5.9 Vision Element #9: Connected, Involved Citizens

In the existing smart city initiative, Kansas City partnered with Cisco and Sprint to install a new public WiFi network downtown. This network will be used to support Internet of Things (IoT) and smart city applications, relevant to all pillars in our concept. The partnership is also in the process of deploying 25 interactive digital kiosks along the new streetcar line and nearby downtown locations for accessing city services, current events, transportation services, local business information, public digital art, local history, and entertainment. In addition, these kiosks may be able to serve as a reverse alert system during emergencies. Kansas City is also the first city to receive Google Fiber, which has laid over 8,000 miles of fiber-to-the-home throughout the region. Kansas City also plans to deploy additional kiosks and expand WiFi coverage in the Prospect Ave Corridor to provide additional connectivity and access to transportation services and employment opportunities, along with alert systems for emergencies. Public WiFi and community interactive kiosks will make crowdsourcing data readily available and increase participation.



Kansas City will continue to focus on connecting the new type of citizen – the “digital citizen.” The digital citizen is a person or business who expects fast and efficient delivery of government services that leverage the power of social media, mobile, analytics, and cloud-based technologies. Connected, digital citizens will contribute data through methods like crowdsourcing to give smart cities more accurate and holistic information. Also, Kansas City’s thriving startup community will be an asset when developing and deploying connectivity mediums, like mobile phone applications. The Kansas City Living Lab, a joint proposal by Cisco and Think Big Partners, is already actively working to accelerate technologies and applications focusing on citizen engagement. A smartphone application for citizen reporting could allow citizens to report street maintenance issues such as potholes or unplowed streets, accidents, and events that are happening throughout the city. This information would then be collected and analyzed by applications, such as the Booz Allen i3-city prototype (which harnesses social media and connected vehicle data to enable large data analytics to enable an integrated, intelligent, and innovative city), and used by the TMC (KC Scout) which would disseminate that information to appropriate entities as well as other media channels.

## 5.10 Vision Element #10: Architecture and Standards

For all aspects of our concept and deployment, it is crucial to have a well-defined set of standards to ensure interoperability, consistency in deployment plans and operations, and adherence to the latest security, performance, and communication requirements. All aspects of the deployment will utilize existing standards for deployment and integration of new technologies. During concept and requirements development, applicable standards will be chosen and documented. There are several existing standards and architectures across multiple industries being used as the foundation for development of new technologies, including but not limited to:

- IEEE standards for communications protocols (e.g., IEEE 1609 Suite)
- NIST and FIPS standards for security and control (e.g., FIPS 140-2, FIPS 199, FIPS 200)
- SAE standards for vehicle architectures and technologies (e.g., SAE J2945)
- Connected Vehicle Reference Implementation Architecture (CVRIA)
- National ITS Architecture
- Kansas City Regional ITS Architecture

All of these existing, and in some cases in-development, standards and architectures will be the starting point for the Kansas City team to develop our technical specifications across all new technologies, including how we manage and secure data; build out new infrastructure or infrastructure components; deploy additional applications and device-based technology; and other back end system changes or integrations.

Kansas City will ensure that we complete development of interoperability and interface architectures as we develop and deploy technologies that will be communicating with multiple systems. We will utilize a systematic approach to review all existing standards, develop requirements based on operational and use case needs, and develop new standards or architectures with the USDOT only where ones do not exist.

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

At the core of any smart city and its systems that enable connectivity, information exchange, analytics, and new citizen services must be a strong, secure, efficient, and affordable information and communications technology (ICT) system. The notion of “smart” is predicated on the ability of data and information to easily be transmitted from a number of sources (sensors, personal devices, vehicles, infrastructure, etc.) then combined at some location (anywhere from the back-end centralized location to an actual device) with advanced analytics to glean insights from those data and information sources. Kansas City has already set much of the foundation for this system and will include all needed elements in our comprehensive plan for execution of our Smart City concepts.

Kansas City has an open data platform powered by Socrata, a cloud-based solutions for Government, which serves as one of the foundational elements. We will build upon this system to develop detailed plans for ensuring that the ICT systems are all secure; include redundancy and contingency plans; are adaptable and scalable; and include multiple approaches for visualization, reporting, analytics, and data storage and management. Advanced ICT systems include multiple ways to transmit and store data, as well as provide insights and targeted information to the right decision makers at the most convenient location (be that desktops, integrated traffic management centers, personal devices, or vehicles and infrastructure elements).

Security and privacy are key to making an integrated and advanced ICT system operate efficiently and effectively. As stewards of public data, the City is setting the highest standards through its recently adopted

data privacy principles and will continue to update those principles as necessary through the Smart City Challenge. We will develop an integrated security concept for attending to the security of data transmission, storage, and usage. Our partner, Booz Allen, has led much of the work in the areas of security and privacy for the USDOT on connected vehicle systems, and is deeply involved in security and privacy concepts and systems for other federal systems, including those at the Department of Defense. The security for connected vehicles is underway with the Security Credentials Management System (SCMS) prototype being built for the CV pilot projects, and Booz Allen is leading one of the pilot sites in developing and ensuring their security and privacy plans. We will take these lessons and expertise to apply and improve upon for our Kansas City Smart City. The scale of the project will be larger than that seen to date, since it will involve additional systems and data transmissions, all of which will be secured using the same tested approach of threat assessment, and control selection based on industry standards, such as NIST or Common Criteria control approaches.

### 5.12 Vision Element #12: Smart Land Use

Kansas City has been working to optimize land use by concentrating growth to avoid sprawl and advocating compact, walkable, and mixed-use development. In 2012, the MARC Board of Directors adopted a Regional Complete Streets Policy, which seeks to increase mobility and access to resources and services for residents of all ages and abilities. Both Kansas and Missouri have adopted Complete Streets policy resolutions, as have 10 counties and cities in the Kansas City region. MARC will continue to work with additional area communities to adopt Complete Streets policies.

Kansas City will continue to incorporate innovative technologies and strategies to promote and guide smart growth and associated compact, mixed-use, mixed-income land use patterns anchored by transit, bicycle, and pedestrian infrastructure. Kansas City has utilized smart land use practices to analyze which corridors and subsections would be best to implement road diets to create safer biking and walking opportunities. From this analysis, 48 streets could benefit from a road diet. Kansas City will work to modify these streets as they become priority on the road resurfacing list. Road diets should also help in calming traffic along corridors with high numbers of bikers and walkers.



The city will also actively encourage and promote transit-oriented, mixed-use development along the downtown street car lane to concentrate growth upward rather than sprawl, within the context of the city's Greater Downtown Area Plan. The City has also developed a comprehensive transit oriented development policy that is being circulated for comment and expected to be adopted later this year. Transit-oriented development should continue to be attractive to millennials which tend to prefer urban living. Kansas City will also make efforts to make better use of downtown parking facilities by partnering with infrastructure and application developers to work toward multi-level, automated parking structures, or those with parking availability information displayed through signs and/or smartphone applications.

## 6. RISKS ASSOCIATED WITH THE DEPLOYMENT VISION

While there are risks to accomplishing Kansas City’s bold vision for the Smart City Challenge, the city will take active steps to mitigate all known risks and continually assess tasks and schedules to document and track new risks. Kansas City’s currently known risks and mitigation approaches are listed in the tables below.

### 6.1 Key Technical Risks

**Table 6-1: Key Technical Risks and Mitigation**

Technical Risk	Mitigation Approach
Private industry capacity to complete testing prior to deployment of vehicles or smart city components	The Kansas City team will develop test plans in coordination with firms
Increased connectivity and system interoperability will increase the impact of cybersecurity attacks	The team will follow industry approaches and standards (e.g., NIST Risk Management Framework) to developing security controls for new smart city components
The city will require new, advanced data processing and storing capabilities to manage enormous amounts of real-time data	The team incorporate data management and advanced data analytics practices within technology deployment processes to identify processing and storing requirements

### 6.2 Key Policy/Institutional Risks

**Table 6-2: Key Policy/Institutional Risks and Mitigation**

Policy Risk	Mitigation Approach
State or national regulations must change concurrently with fielding of new technologies	The team will utilize the City’s Office of Innovation, the UMKC Law School, and City Council Legislative Committee to monitor, prioritize, and propose Smart City legislation at local, State, and Federal levels. The City will partner with Greater Kansas City Chamber of Commerce and KCnext, the technology council for Greater Kansas City in support of Smart City legislative initiatives
Kansas City data privacy and general security policies must change concurrently with fielding of new technologies	The team will incorporate the identification of privacy and security challenges and mitigation practices within technology deployment processes
Government and private partner organizations may need to modify data sharing policies to facilitate smart city challenge efforts	The team will review current data policies and coordinate to make the necessary modifications without revealing proprietary or PII-related information
Kansas City may need to update funding mechanisms to account for new operations and maintenance funding requirements	The team will determine new O&M requirements based on deployed roadway and communications infrastructure and work with the necessary organizations to propose modified or new funding mechanisms
Transportation planners will need to adjust planning processes to incorporate CV/AV technologies	The team will work with MODOT and MARC to adjust planning processes to incorporate smart city initiatives and general CV/AV considerations in long range plans
Public transportation employee uncertainty on potentially being monitored or losing jobs as a result of CV/AV technology	The team will ensure AV testbeds are in addition to (not replacing) existing services and work with KCATA to implement processes and procedures to ensure compliance in using new technology such as Mobileye
City Hall does not have the resources for in-house, full time project management	The team will utilize partners Booz Allen Hamilton and ECCO Select to manage the projects

## 7. TEAM PARTNERS

**Innovative partnerships** among city or local government, planning organizations, the private sector, vehicle manufacturers, academia, associations, and other stakeholder groups are needed to advance smart city solutions. Kansas City has already secured partnership commitment from various organizations, and are in initial conversations with others for inclusion in a full team for Phase 2.

**Table 7-1: Existing Kansas City Partners**

Existing Partners	
Public	
Kansas City Area Transportation Authority (KCATA)	KCATA has two operating Metro Area Express (MAX) bus lines. Main St. MAX links the River Market, Downtown, Union Station, Crown Center, and the Country Club Plaza. Troost MAX links Downtown, Hospital Hill, Stowers, UMKC and Cerner. MAX provides real-time GPS tracking, real-time passenger info, and transit signal priority automatically changing lights to favor of buses if behind schedule. The next MAX line will be on Prospect and will be incorporated as an integral part of the Smart City.
KC Streetcar Authority	The Kansas City Streetcar Authority oversees operations and maintenance of the City's 2-mile modern streetcar project. The new streetcar line is expected to open by Spring 2016, and will run between River Market and Union Station. The KC Streetcar has served as the backbone to current Smart City deployments downtown and will serve as an on-going laboratory for new technologies and applications.
KCMO Office of Innovation	The Office of Innovation supports the development and integration of new technologies into city operations, develops, improves internal city processes and processes ordinances to integrate these evolving technologies, and manages supporting contractors who conduct Smart City initiatives. The office is responsive to both the Mayor and City Manager, and is therefore structured to both develop policy as part of the Mayor's team and implement programs on behalf of the City Manager.
KC Scout	KC Scout is the area's traffic management system. It uses cameras for highway monitoring, sensors to gauge traffic flows, and activates electronic message boards and an advisory radio system to send traffic notices to drivers, which lessens traffic jams, increases safety, and improves emergency response.
Missouri Department of Transportation	MoDOT created the Road to Tomorrow, a transportation laboratory for testing and constructing highway technology. It promotes technology developments such as truck platooning, data communication, and renewable energy. They are also integrating smart pavement roadways systems along interstate 70.
Private	
Booz Allen Hamilton	Booz Allen works closely with the USDOT, DOE, other federal agencies, and private stakeholders on research, development, and testing in key Smart City Challenge areas. Their transportation, federal, and commercial contracting experience in energy, water, land use, communications, and cyber security, among other domains will help Kansas City develop an inclusive and integrated Smart City. The firm has deep capabilities in analytics, connected technologies, and IoT solutions, which will be brought to bear on our Smart City deployments.
Cisco Systems, Inc.	Cisco has evaluated city department needs to provide a program to enhance internet connectivity, enable efficiencies in management of public infrastructure, and introduce new revenue streams. Cisco will provide real-time information and services through: public WIFI and community kiosks.
ECCO Select	ECCO Select is recognized as an innovative technology leader providing proven IT services, solutions and staffing. Our capabilities in program management, systems integration, and custom software development create scale and flexibility in leading and participating in critical tasks for the City of Kansas City Smart + Connected Communities initiative.
Sensity System	Sensity System will add Sensity sensors and integrated LED street lighting that will capture data and be incorporate to Smart City applications.
Sprint	Sprint will assist with a new public Wi-Fi network for downtown that will provide free internet access to, which will help meet KC goal of being a digitally inclusive city. This Wi-Fi network will provide the connectivity necessary to support smart city applications and infrastructure.
Think Big Partners	Think Big Partners is part of the Living Lab joint effort for Kansas City. The Living Lab is vital for innovation and commercialization of Internet of Things (IOT) technologies and creates opportunities for entrepreneurs to build high growth companies, partner with large companies needing assistance and allows KCMO to reap the financial and social benefits while improving quality of life and reducing costs.

**Table 7-2: Potential Kansas City Partners**

Potential Partners	
Public	
KC Digital Drive	KC Digital Drive will help Kansas City become a Smart City by connecting everyone to affordable broadband Internet, and make emerging technology equitable and accessible; giving more opportunity and resources to create new technology ventures and applications that will grow the economy.
Code for KC	Kansas City's chapter of the Code for America Brigade network, a volunteer group of developers, designers, and data scientist who collaborate with local government and community partners to build tools to help the city. Code for KC could aide in the development of mobile applications or websites.
Kansas City International Airport (KCI)	KCI is a public airport 15 miles northwest of downtown Kansas City, in Platte County, Missouri. In 2014, 10.2 million passengers used the airport. The integration of KCI into the Smart City will increase efficiency for airline companies as well as travelers.
KC Startup Village (KCSV)	KCSV is an entrepreneur-led community helping to grow and support entrepreneurs and the Kansas City startup ecosystem. KCSV will promote technology companies to startup in Kansas City.
KCS / KC Terminal Rail	KCS offers rail route between the industrial heartlands of the United States and Mexico. They offer transportation throughout North America with all Class I railroads, short line partners, ports, transload centers, and intermodal ramps. The integration of KCS into the Smart City will increase rail transport efficiency of goods and services through information and communication technologies with supporting entities.
Prospect Ave Corridor Reps	The Prospect Bus Rapid Transit Advisory Committee is chaired by KCMO Councilmembers and consists of 50 corridor stakeholders (residents, pastors, business leaders, community leaders, etc.) providing input to the City and KCATA on Prospect Ave Corridor development. The Prospect Avenue Business Group is an emerging organization of business owners, non-profit organizations and public representatives focused on the development of the Prospect Avenue corridor.
University of Missouri-Kansas (UMKC)	UMKC's Computer Science and Electrical Engineering department is a leader in courses pertaining to Smart Cities such as Internet of Things and Cloud Computing. UMKC researchers are making Smart City relevant innovations like WiFi-honk and WiFi-Amber. Also, the UMKC School of Law has organized two Smart City related Conferences -Law, Technology & Public Policy course and related initiatives.
Private	
Amazon Web Services	A cloud based platform is an imperative aspect for Smart City data. Amazon Web Services offers several resources that will help with large data storage and computing.
Automotive Partnership	Automotive partnerships well help automated vehicle and connected vehicle test beds develop in Kansas City. Close collaboration between automotive partnerships, analytics firms based and universities will pave the way for future implementation in similarly sized and larger cities.
Bridj	Bridj is a transportation system that adapts in real time to where your pick up and drop off location. A pilot program between Bridj and KCATA is being developed which will integrate into the Smart City.
Freight Partnerships	Freight partnerships with companies like DHL and FedEx will be key when developing smart city concepts around the vision Urban Delivery and Logistics.
Google	Kansas City was the first city to receive Google Fiber, Google's broadband internet and cable television service. Kansas City will be able to integrate Google's fiber optics in the Smart City.
Integrated Roadways	Kansas City-based small business develop innovative pavement systems including off site construction, compartmentalized installation and integrated digital sensors that will work with current sensor systems.
Intel	A partnership with Intel will help Kansas City's Smart City Manage IOT logistics.
KC Next	KC Next is a network of multinational corporations and entrepreneurs in tech industries (healthcare IT, telecommunications, digital media, etc.). Their network will help spread Kansas City's Smart City vision.
KCP&L	Kansas City Power and Light Company is an electric utility company serving the Kansas City metropolitan area. KCP&L will play an integral part the Smart City's smart grid system.
Rhythm Engineering	Rhythm Engineering is traffic software and engineering firm that develops real-time adaptive traffic control systems that enable traffic signals to immediately adapt to traffic demand. This software could help fully integrated traffic signals into the Smart City.

## 8. EXISTING TRANSPORTATION INFRASTRUCTURE

Kansas City’s existing transportation infrastructure provides unique opportunities to capitalize on several smart city initiatives. Utilizing an established ITS infrastructure and strategic partnerships (e.g., Google), Kansas City is poised to expand and increase its mobility services, leverage the current infrastructure to effectively implement AV/CV and data analytics technologies, and capitalize on current and on-going efforts to advance information sharing and data dissemination to improve transportation operations and services.

**Table 8-1: Existing Kansas City Transportation Infrastructure**

Kansas City Infrastructure	Details
<b>Arterial Miles</b>	<ul style="list-style-type: none"> <li>● Principal arterials and major collector roads: 4,000 lane-miles (1,745 centerline)</li> <li>● Minor arterials, minor collector roads, and local streets: 2,000 lane-miles (975 centerline)</li> <li>● Supports over 15 million urban area daily vehicle miles of travel</li> </ul>
<b>Freeway Miles</b>	<ul style="list-style-type: none"> <li>● Interstates and expressways: 2,000 lane-miles (400 centerline)</li> <li>● Supports over 21.5 million urban area daily vehicle miles of travel</li> <li>● Serves over 70% of the vehicle miles traveled in the Kansas City metropolitan area</li> <li>● Contains the most freeway lanes per capita of any other city in the United States</li> <li>● One of only six cities in the country with four primary interstate highways within city limits</li> </ul>
<b>Transit Services</b>	<p><u>Kansas City Area Transportation Authority (KCATA)</u></p> <ul style="list-style-type: none"> <li>● 54,000 daily boardings</li> <li>● 646 miles of regular bus service on 58 routes</li> <li>● 25 miles of bus rapid transit on two routes with a third BRT in Project Development               <ul style="list-style-type: none"> <li>○ Provides faster, more frequent service, and features information markers at well-lit stations showing real-time arrival information</li> <li>○ Kansas City Streetcar Authority</li> </ul> </li> <li>● Two-mile streetcar line scheduled for opening Spring 2016</li> </ul>
<b>Shared-Use Mobility Services</b>	<ul style="list-style-type: none"> <li>● Bike sharing:           <ul style="list-style-type: none"> <li>○ Designed for short trips</li> <li>○ Compliments transit system</li> <li>○ Provides low cost access to jobs and services</li> <li>○ Logged over 19,000 bike trips, totaling 64,000 miles traveled</li> </ul> </li> <li>● Car sharing:           <ul style="list-style-type: none"> <li>○ Aimed at individuals who only require the use of a vehicle for a short time</li> <li>○ Services available at University of Missouri-Kansas City</li> <li>○ Services available at Kansas City International airport</li> </ul> </li> <li>● Other ride sharing           <ul style="list-style-type: none"> <li>○ Uber</li> <li>○ Traditional taxi services</li> </ul> </li> </ul>
<b>Information and Communication Technology (ICT)</b>	<ul style="list-style-type: none"> <li>● 3<sup>rd</sup> largest increase overall in high-tech startup density</li> <li>● Ranked 1<sup>st</sup> in the nation for highest increase in high-tech startup density related to ICT</li> </ul>
<b>Intelligent Transportation Systems (ITS)</b>	<ul style="list-style-type: none"> <li>● Kansas City Scout           <ul style="list-style-type: none"> <li>○ Manages traffic on more than 125 miles of freeway</li> <li>○ CCTV cameras</li> <li>○ Traffic flow sensors</li> <li>○ Electronic message boards</li> <li>○ Bi-state traffic management center</li> <li>○ Highway Advisory Radio (HAR)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>o My KC Scout traveler information app</li> <li>● Ramp metering <ul style="list-style-type: none"> <li>o Reductions in overall accidents by 64%</li> <li>o Reductions in merging-type crashes by 81%</li> <li>o Improvements in consistent travel times and speeds</li> </ul> </li> <li>● Operation Green Light <ul style="list-style-type: none"> <li>o Helps synchronize traffic signals on major routes</li> <li>o Reduced delays on coordinated routes by an average of 17%</li> <li>o Allows analysts to make changes to signalization from a centralized office</li> <li>o Allows for future adjustments/changes in the way roadways are used (e.g., to account for varying levels of pedestrian, bicyclist, and/or public transportation users)</li> </ul> </li> <li>● Weather-Response System (WRS) <ul style="list-style-type: none"> <li>o Supports weather-responsive transportation operations</li> <li>o Allows users to select desired conditions and determine when such conditions are predicted for a specified area</li> <li>o Useful for scheduling incident response staff/operations and managing traffic operations before and during adverse weather</li> </ul> </li> <li>● Environmental Sensor Stations (ESS) <ul style="list-style-type: none"> <li>o Collects road surface condition, road/bridge surface temperature, precipitation rate, wind speed, air temperature, humidity, subsurface temperatures, dew point, barometric pressure, and visibility</li> </ul> </li> </ul>
<b>Smart Grid Infrastructure</b>	<ul style="list-style-type: none"> <li>● Partnered with Google to receive and implement Google Fiber, Google's ultra-fast, one-gigabit-per-second broadband internet access</li> <li>● Clean Charge Network, the largest electric vehicle charging operation in the United States <ul style="list-style-type: none"> <li>o Consists of over 1,000 electric vehicle charging stations</li> <li>o Capable of supporting more than 10,000 electric vehicles</li> <li>o Offers free charging on every station to all drivers for the first two years</li> <li>o Fast charging stations – charge vehicles from empty to 80% in about 30 minutes</li> <li>o Standard stations – provide most electric vehicles with a 25-mile charge per hour</li> </ul> </li> </ul>

## 9. DATA NEEDS AND AVAILABILITY

### 9.1 Current Data Collection Efforts and Data Policies

Kansas City currently collects a broad range of data relating to city service operations and assets. Many key data sets are provided in a machine readable format through the City's open data portal, Open Data KC. The City's Data Governance Committee is currently undertaking a department-by-department data inventory to identify and prioritize other high value datasets for public release.

Open Data KC also helps to feed the city's public-facing performance management program, KCStat. KCStat focuses on monitoring the City's progress toward its Five-Year Citywide Business Plan through monthly meetings as well as the KCStat Dashboard, which provides an "at-a-glance" view of the Business Plan's goals, objectives, and metrics. Underlying KCStat and the city's strategic goals, DepartmentStat is a collaborative effort between the City Manager's Office and key service departments to utilize data-driven management to meet departments' goals. Not only does this effort focus on building capacity for data analysis, but these operational goals also are foundational for the city's pursuit of its strategic goals.

Kansas City has partnered with What Works Cities, a national initiative to help 100 mid-sized cities enhance use of data and evidence to engage residents, make government more effective, and improve residents'

lives. This partnership has led to greatly expanding the existing open data efforts in alignment with best practices. The city also recently passed a revised Open Data policy which created the position of Chief Data Officer, extends open data to component units, and required more accountability from departments on opening up data. This new policy helped form a Data Governance Committee to build internal data capacity, stewardship, and utilization. After reviewing against privacy policies, new data and information generated during the Smart City Challenge will be shared with the appropriate partners such as KCATA and KC Scout, as well as published to Open Data KC and KCStat.

## 9.2 New Data Collection and Integration

Kansas City proposes to collect multiple new data sets during the Smart City Challenge including, but not limited to, gunshot detection, vehicle situation, social media, transit user volumes, and population movement data. This data will be used to optimize transportation services as well as to feed the data analytics platforms discussed in the Urban Analytics vision element. A data bus will be developed to receive data feeds from new intelligent infrastructure, sensors, CV, AV, and potential partners (e.g., ride-hailing companies). As with all other systems, the data bus will be developed with privacy and security as primary objectives, while providing machine-readable, real-time application program interfaces. Kansas City will manage this new data with team partners and share as appropriate with Open Data KC based on open data policies to fuel entrepreneurship and innovation. When integrated, existing and new data will be used by partners and transportation providers and managers such as KCATA and KC Scout. The newly integrated data will be used to address further city challenges and improve the quality of life for all citizens by making city service delivery more customized, targeted and seamless.

Kansas City will work with other entities to integrate data to provide synergies for urban analytics by innovative applications. The integration of data currently takes place through algorithms developed by City of Kansas City Office of Performance Management or developed by a contractor supporting that office. In the Smart City Challenge, the Office of Performance Management will work with partners to create a data hub that will integrate data from multiple organizations into a single platform. This new system will provide data in a machine-readable format, a portal for developers to build applications and tools, and data logs for interested parties to conduct research.

Integrating data with KCATA and KC Scout could realize huge benefits in optimizing transportation services and investment in transportation services and necessary infrastructure. Other benefits of integrating data from existing and proposed new sources include:

- Gunshot detection data will be integrated with data on patrol car usage to improve public safety and better use of assets
- Population density data may lead to changes in education, training and aid agency planning activities
- Population density data may also encourage business development on Prospect MAX corridor, especially with increased public safety that is data supported

## 9.5 Cross-cutting Partnership

Kansas City plans to develop partnerships to share data with KCATA, KC Scout, and other potential partners such as ride-hailing companies to improve urban analytics and services. By establishing partnerships and sharing data with other transportation providers and related organizations, Kansas City will be able to more effectively identify problem areas (e.g., congested corridors, unsafe intersections) within the urban transportation system. This new data could be used to further identify areas to deploy V2I technologies, improve Operation Green Light traffic signal management, and implement smart land use initiatives such as

road diets. In establishing partnerships, Kansas City will analyze the data to be shared to determine the necessarily controls to protect the privacy interests of citizens and public security.

Kansas City is also currently partnered with UseAgility, a local UX firm, through the Mayor’s Challenge Cabinet to test potential redesigns of the Open Data homepage. Kansas City will continue to work with this firm throughout the Smart City Challenge to integrate new data to the homepage.

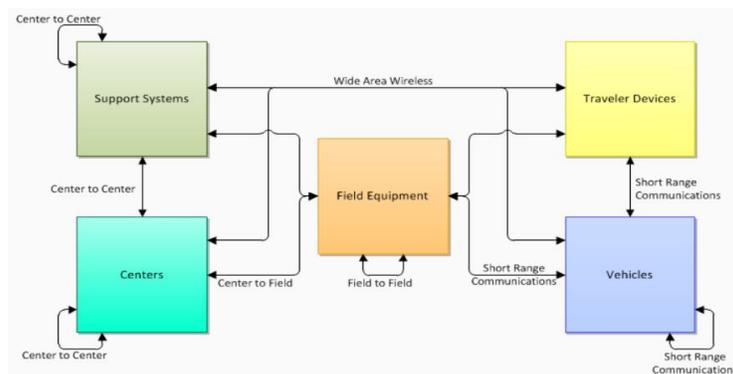
## 10. ITS AND CV STANDARDS/ARCHITECTURE

The National ITS Architecture is a mature architecture that provides a common framework for the ITS community to plan, define, and integrate ITS solutions. The Connected Vehicle Reference Implementation (CVRIA) was developed to extend the National Architecture to include detailed information to support development of fully interoperable regional connected vehicle architectures. The CVRIA and the associated SET-IT software tool will be fully integrated into the National ITS Architecture and software toolset to support development of interoperable architectures including complete ITS infrastructure and connected vehicle capabilities along with interface information needed for standards selection. The CVRIA is based on a set of applications defined by various connected vehicle programs. The source for all the application descriptions ranges from ConOps, Requirements Specifications, or existing Standards and Architectures.

CVRIA has a list of CV applications grouped according to: environment, mobility, safety, and support needs. Once an application is selected, a description of the application is provided, as well as a physical diagram (as seen in Figure 10-1). The physical diagram identifies the type of hardware required, and categorizes the hardware into groups.

Kansas City will heavily rely on CVRIA and its own regional ITS Architecture to identify relevant applications and technologies to: reduce congestion, keep travelers safe, protect the environment, respond to climate change, connect underserved communities, and support economic vitality. CVRIA will allow Kansas City to identify the type of application and hardware required to implement the application.

**Figure 10-1: CVRIA Physical View which describes the connections between Physical Objects within the CV Environment for a specific application**



The Kansas City Regional ITS Architecture will help the deployment of interoperable systems without impeding innovation as technology advances, vendors change, and new approaches evolve. The regional architecture is built upon standard documents from organizations such as AASHTO, ITE, NEMA, APTA, ASTM, IEEE, and SAE. An example of a regional standard that will be used to help Smarty City development in Kansas City is the ASTM E2468-05: Standard Practice for Metadata to Support Archived Data

Management Systems. This standard includes, but is not limited to, data management standards for RIDESHARE, KDOT Traffic Data Warehouse, KDOT KanRoad Reporting System, KCMO Parking Management, KCATA Operations Center, and Kansas City Scout Operations Center.

## 11. MEASURABLE GOALS AND OBJECTIVES

Kansas City’s technology initiatives are a catalyst for connecting communities and fostering economic development. Currently tracked key metrics, in terms of progress, are geared toward building the capacity to plan and track smart city process and engagement. Table 11-1 captures the current KCMO Digital Roadmap goal categories, as well as the objectives, and potential metrics, aligned to goals, to measure success.

**Table 11-1: Overview of Digital Roadmap Goals**

Category	Goals	Metrics
Digital Inclusion	<ol style="list-style-type: none"> <li>1.) Develop a City-wide digital inclusion policy aimed at bridging Kansas City’s digital divide.</li> <li>2.) Develop City-wide digital strategies to increase public access to free Wi-Fi, and to manage public infrastructure.</li> <li>3.) Improve approaches to technology procurement with a focus on digital literacy, professional skills, communications, operations and service delivery</li> </ol>	<ol style="list-style-type: none"> <li>1.) The Republic’s Center for Digital Government ranking for digital cities</li> <li>2.) Number of Sprint Public Wi-Fi hotspots and City Post Kiosks</li> <li>3.) Percentage of use of hotspots and kiosks</li> <li>4.) Living Lab and KC Smart City Workshop/Number of Industry Partners</li> </ol>
Open Government	<ol style="list-style-type: none"> <li>1.) Make data more accessible to residents.</li> <li>2.) Develop strategies and supporting policies to identify and provide data that is most valuable to the community.</li> <li>3.) Enhance operations by ensuring timely delivery of data and internal collaboration.</li> </ol>	<ol style="list-style-type: none"> <li>1.) KC Digital Drive and creation of data portals (like KC Open Data Portal)/Open Data Catalog</li> <li>2.) Number of data dictionaries and visualization standards to identify useful info in apps such as Open Data Catalog</li> <li>3.) Number of applications launched to navigate annual budget and government processes</li> </ol>
Engagement	<ol style="list-style-type: none"> <li>1.) Build on the initial success of 311 and other digital engagement platforms.</li> <li>2.) Enhance mobile accessibility of digital services and information.</li> <li>3.) Focus on implementing best practices and support feedback from the community.</li> </ol>	<ol style="list-style-type: none"> <li>1.) Number of 311 application updates</li> <li>2.) Number of employees cross-trained in digital resources</li> <li>3.) SMART, team of social media leaders, to collect feedback</li> </ol>
Industry	<ol style="list-style-type: none"> <li>1.) Support technology startup infrastructure.</li> <li>2.) Foster sustainable partnerships with regional academic institutions.</li> <li>3.) Create a smart city living lab to enable entrepreneurs to test ideas in Kansas City.</li> </ol>	<ol style="list-style-type: none"> <li>1.) Number of partnerships and programs to provide a platform for start-ups (like Living Lab)</li> <li>2.) Number of university partners</li> <li>3.) Number participants in the Living Lab/Innovation Partnership Program</li> </ol>
Smart City	<ol style="list-style-type: none"> <li>1.) Establish a Smart City advisory structure to benchmark and measure the success of Kansas City’s Smart City infrastructure investment.</li> <li>2.) Leverage data and analytics to drive performance management, and explore the potential of predictive modeling to work smarter.</li> <li>3.) Embrace a paperless City Hall by developing a priority list of digitizing processes.</li> </ol>	<ol style="list-style-type: none"> <li>1.) Number of successfully completed projects that were supervised by the advisory board</li> <li>2.) Number of sensors and size of real-time data which monitor real-size data</li> <li>3.) Percent reduction in paper consumption</li> </ol>

For the three pillars of our Smart City vision, we will leverage the current goals and metrics, as well as develop more detailed ones that will measure the effectiveness of our efforts along a broad spectrum of outcomes. These outcomes will include traditional transportation measures, such as throughput, numbers of incidents, and overall performance of the system with new measures and outcomes that address the intended goals of the Smart City Challenge, including but not limited to:

- Use of new technologies (kiosks, transit applications, connected vehicle applications, etc.)
- Satisfaction with new technologies
- Usage of expanded transit options
- Economic development that can in some way be tied to new deployments
- Changes in air quality and congestion
- Efficiency of the freight system
- Safety along the Prospect Ave Corridor
- Number of start-ups participating in the new initiatives
- Number of traffic collisions
- Accessibility for the visually impaired

Kansas City has already been working with other cities and partners to better understand traditional approaches to measuring the technology deployment around smart cities. Kansas City has utilized our Smart Cities framework to illustrate key data points for reference. The current Kansas City deployments and vision contain five dimensions which are used to measure goals and objectives. The five goals are: Environment, Mobility, Government, Society, and Quality of Life. Kansas City will use these and additional goals and measures during our Smart City Challenge deployment. The table below includes the measures for the five goal areas.

**Table 11-2: Current Performance Measures**

Dimension	Working Area	Indicator	Description
<b>Environment</b>	Smart Buildings	Sustainability-certified Buildings	Number of LEED or BREAM sustainability certified buildings in the city
	Resources Management	Total Energy Consumption	Annual Total Electrical Energy Consumption per capita (in mWh)
		Carbon Footprint	Annual CO2 emissions per capita (in tonnes)
		Waste Generation	Annual total waste volume generated by the city per capita (in kg)
	Sustainable Urban Planning	Green Space per Capita	Urban green open areas per capita (in m <sup>2</sup> )
<b>Mobility</b>	Efficient Transport	Clean Energy Transport	Percentage of Clean-energy Transport use (electric train, subway/metro, tram, cable railway, electric taxis, bicycling)
	Multi-modal Access	Public Transport Use	% of Public transit trips/ Total trips
<b>Government</b>	Open Government	Open Data	Open Data Use
<b>Society</b>	Integration	Internet-connected Households	Percentage of Internet-connected households
	Education	University Graduates	Number of University Graduates per 1000 inhabitants
<b>Quality of Life</b>	Safety	Crime	Number of crimes per 100,000 inhabitants
	Health	Life Expectancy	Life Expectancy at birth

## 12. PAST PERFORMANCE (OR CAPABILITY EVIDENCE)

Kansas City and its essential partners have experience that directly relates to some capacity of Smart Cities. Listed below are the distinct capabilities from previous performances that will give Kansas City an advantage when developing and deploying their Smart City.

### **KCMO Existing Smart City Initiatives**

- Kansas City's Smart City Initiative is part of the IEEE Core Smart Cities. They work with the local IEEE chapter to develop knowledge, share experience with core cities and support entrepreneurs working with city governance bodies, local industries, local universities, students.
- Created the Smart City Advisory Board to advise management and implementation policies of smart city technology, future smart city integration, and establish program evaluation metrics.
- Kansas City implemented online resources for citizens to reach city officials, obtain information, and do business. Resources include: airport parking facilities, Municipal Court ticketing services, Parks & Recreation resources, Water Services payment and service options, Snow Plow GPS tracking, and Financial and Business services through QuickTax, KCBizCare, and LandBank.
- Improved sustainability by monitoring systems running solar panels and wind turbines; strategically mapping infrastructure improvements, and regulating electric usage to conserve energy resources.
- Kansas City has expanded digital access by offering free Wi-Fi services in libraries, civic buildings, and recreation centers. These efforts are further promoted through engagement with partners such as Code for America, KC Digital Drive, Next Century Cities, and the National League of Cities.
- The Open Data Catalog provides residents City data (e.g., crime stats, traffic counts, 311 information, etc.). Open data is also available to be used by civic entrepreneurs – individuals or companies that will make a business while also bettering government and how it affects citizens.
- Created the Open Data Ordinance and hired a coordinator. Performance management functions enhance resident engagement, accountability, and transparency of City operations. They include internal audits, citizen satisfaction surveys, and KCStat reports on council priorities and public-facing dashboards. These functions are open and available to residents via online tools and social media.
- The City has a full-time social media manager to engage with citizens. They also interact with citizens through Nixle, a text notification system, and Nextdoor, a neighborhood social media network.

### **KC Scout**

- KC Scout employs sensors over 8,000 highway miles in the Kansas City region and provides updates to commuters via digital signage and SMS texts. The system uses cameras, sensors and electronic message boards to detect and solve problems and incidents on roadways.
- KC Scout developed a website that features information for citizen. Content includes real-time camera views and traffic flows, activated message boards, and information on freeway work zones.

### **KC Streetcar Authority (KCSA)**

- KCSA is 501(c)(3) organization dedicated to deploying the new streetcar
- KCSA is initiating application-based data exchanges in the downtown area to serve as a pilot for technology concept expansion and streetcar management.

### **MoDOT**

- Road to Tomorrow is a transportation laboratory along interstate 70 from Kansas City to St. Louis for testing and developing new highway technology. They intend to develop a smart highway that incorporates truck platooning, data/communication, and renewable energy.
- MoDOT is working on integrated roadways systems along interstate 70 through a public private partnership using smart pavement technologies.

### **Kansas City Area Transportation Authority**

- KCATA launched bus rapid transit line, the Metro Area Express (MAX) on Main Street and has implemented a second MAX line on Troost. MAX features technology including: real-time GPS bus tracking, real time arrival information at every station and green light prioritization.
- They supply real time General Transit Feed Specification (Google Transit Feed) data allowing access to both scheduled and real time location data on all buses
- KCATA is leading efforts to integrate technologies across the region's transit operators for unified real time passenger information and fare data in one accessible vehicle location system. They are also committed to equipping all buses with on board customer Wi-Fi access in 2016.

### **Booz Allen Hamilton**

- Booz Allen is playing a significant role in USDOT's Vehicle Automation Program by conducting technology assessments and standards planning.
- Booz Allen has been supporting both federal agencies and automobile manufacturers in developing applications, technologies, security, and policies related to connected vehicles.
- Booz Allen supports the CV Pilot in Tampa, FL- one of only three pilots awarded.
- Booz Allen leads the AASHTO V2I Near Term Deployment project and analyzes key V2I topics to facilitate planning and inform infrastructure investment decisions by state and local agencies.
- Booz Allen has deep IoT, analytics, and data management experience across both federal and commercial environments, and can bring architectures, protocols, and solutions to Kansas City
- Booz Allen provides strategy, planning, analysis, outreach, and communications support to the DOE Grid Modernization Initiative, a multi-year joint R&D and technical assistance program involving public and private stakeholders to help achieve a future, modernized electric grid for the U.S.

### **ECCO Select**

- ECCO Select currently provides program management services to the City of Kansas City for the City's Streetcar initiative leveraging several smart city concepts
- ECCO Select's experience with Kansas City companies will provide partnership opportunities to the Smart City vision. They developed architecture strategy for Aquila, an electricity and natural gas distribution network, through identification and prioritization of capabilities matching IT Architectural direction with cooperate strategic direction.
- Led technology staffing and network support for PeopleSoft by supplying functional and technical resources for implementation, technical documentation specialists, trainers and project managers.
- ECCO Select led the Drive Cam Installation Project for First Student Bus Company through logistics and installation of 500 mobile camera devices in a school bus fleet.

### **Think Big**

- Think Big Partners created the Smart City Tech Summit, a conference that focuses on high-profile urban challenges by combining education, best practices, training and lessons learned with the smart technology solutions that can be used to improve outcomes in each targeted sector.
- Think Big Partners has launched an IoT-focused innovation center model in which a cluster of companies from around the country are choosing to locate themselves in Kansas City and work at Think Big Coworking in order to take advantage of the smart city experience and access to IoT technology expertise.

# 13. OPPORTUNITIES TO LEVERAGE FEDERAL RESOURCES

Kansas City will leverage other federal resources to amplify the impact of the Smart City Challenge across the city and other transportation projects. Kansas City will coordinate Smart City Challenge efforts with the following existing and potential projects already using federal resources.

**Table 13-1: Kansas City Opportunities to Leverage Federal Resources**

Resource/Project Name	Status	Description	Federal Funding Amount
<b>TIGER Grant – Green Impact Zone Infrastructure Improvements</b>	Complete	Urban core infrastructure improvements within the Green Impact Zone, Smart-Grid, and regional high-priority transit corridor improvements	\$50 Million (Approved)
<b>Kansas City Streetcar</b>	Under Construction	2 Mile Modern Streetcar System with integrated technology deployment	\$20 Million Tiger, (Approved) \$16 Million STP (Approved) \$1.2 Million CMAQ (Approved)
<b>KCATA - STP Funds for Prospect MAX</b>	Project selected for STP funds through local competitive process	STP funds for Prospect MAX design and construction	\$3.5 Million (Approved) \$4.5 Million (Requested)
<b>KCATA - FTA Small Starts for Prospect MAX</b>	Fund Requested to FTA in Sept. 2015	Small Starts funds for Prospect MAX. Prospect MAX has been approved for Project Dev. by FTA	\$29.9 Million (Requested)
<b>KCATA – Federal Ladders of Opportunity Grant</b>	Construction Contracts Awarded	Infrastructure Upgrades including traffic signals on Prospect from 22 <sup>nd</sup> to 28 <sup>th</sup> St.	\$1.2 Million (Approved)