Proposal For
US DOT Designation of
Automated Vehicle Proving Grounds

Presented by
The Utah Department of Transportation

December 19, 2016

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

SHANE M. MARSHALL, P.E.
Deputy Director

December 19, 2016

EMAIL: automation@dot.gov

The Honorable Anthony Foxx
Secretary of Transportation
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Secretary Fox:

SUBJECT: Docket Number DOT-OST-2016-0233 Proposal for Designation of Automated Vehicle Proving Grounds Pilot

The Utah Department of Transportation (UDOT) offers the attached proposal in response to Docket Number DOT-OST-2016-0233, Solicitation of Proposals for Designation of Automated Vehicle Proving Grounds Pilot. UDOT is known for embracing innovation and applying new technologies, and we view automated and connected vehicle technology as a tool that can help us take operations and public safety to a new level.

In the recent *Federal Automated Vehicles Policy*, the USDOT expresses encouragement about the "potential for HAV systems to use other complementary sensor technologies such as vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) capabilities to improve system performance." With the release, last week, of the NHTSA Notice of Proposed Rulemaking on V2V communications for light vehicles, it is clear that connected vehicle technology will play an integral role in the transformation of road safety and traffic operations. UDOT fully supports a future of "connected automation" in vehicles. In support of this future, UDOT offers an 11-mile urban arterial street in the Salt Lake City area, Redwood Road, as the Utah Connected and Automated Vehicle Proving Ground, and pledges to contribute and collaborate as part of a national Community of Practice.

The Utah Connected and Automated Vehicle Proving Ground offers a unique facility for testing and demonstrating connected automation. With operational DSRC infrastructure from multiple hardware vendors, full fiber connectivity to 35 intersections, advanced signal performance metrics, third-party probe data for real-time and historical traffic conditions, robust data on crash history and weather, and a variety of traffic conditions, this corridor provides an environment fully conducive to developing and improving vehicles with connected and automated features, including Highly Automated Vehicles (HAV).

UDOT is known as an organization that encourages innovative action. As the first state department of transportation to employ design-build techniques on large highway infrastructure, we have continued to break new ground with accelerated bridge construction, innovative intersections (diverging diamonds, continuous flow interchanges, and thru-turns), traffic signal performance measurement, road weather performance management, and truck platooning testing. We have been involved in connected vehicle planning and implementation for fifteen years through various TRB, FHWA and AASHTO committees and panels, and are actively working to bring these new technologies to fruition on our infrastructure. The DSRC infrastructure on the Redwood Road corridor is already being installed for a transit signal priority application. Operation of the Utah Connected and Automated Vehicle Proving Ground does not require a paradigm shift for us, just a continuation of the progressive attitude that pervades UDOT.

UDOT is committed to automated and connected vehicle technology. We look forward to working with the United States Department of Transportation and many other public and private entities to demonstrate, test, share, and improve these technologies in the State of Utah, with the ultimate goals of saving lives, improving mobility, and expanding opportunities for people and communities who haven't been fully served. We believe that our Utah Connected and Automated Vehicle Proving Ground will be an ideal vehicle to help accomplish those goals. We invite your review of our proposal and look forward to your positive response.

Sincerely,

Carlos M. Braceras, P.E.
Executive Director

CMB/BL/dej

Cc: Shane Marshall, UDOT Deputy Director
Jason Davis, UDOT Operations Manager
Rob Clayton, UDOT Traffic Management Director

INTRODUCTION

The Utah Department of Transportation (UDOT) believes that automated vehicle (AV) and connected vehicle (CV) technology embodies viable, long-term tools that can help us achieve our agency's vision to "*Keep Utah Moving"* by enhancing mobility, increasing safety (towards UDOT's goal of Zero Crashes, Injuries and Fatalities), and optimizing the value of our infrastructure investment. There is broad recognition that these two technologies, CV and AV, provide important synergy in the automobile of the future; that communication between the vehicles, and with the infrastructure, enhances and expands the ability of the AV sensors and provides important redundancy. The result is a safer car, more rapid expansion of the "mobility on demand" model, and a travel experience that is more reliable.

Connected vehicle technology can enhance and expand the capabilities of automated vehicle sensors and should be evaluated in parallel.

UDOT applauds the efforts of the US Department of Transportation to assemble a diverse network of testing sites into a Community of Practice. Recognizing the important synergy inherent in connected and automated vehicles (CAV), and in support of the USDOT announcement last week of a proposed rule to require vehicle-to-vehicle (V2V) communication, UDOT offers our 11-mile connected vehicle corridor in Salt Lake City as the Utah Connected and Automated Vehicle Proving Ground. This corridor follows Redwood Road, a state-owned, north-south arterial in the Salt Lake metro area, through 35 signalized intersections. Redwood Road traverses industrial areas, commercial districts, residential neighborhoods, and educational institutions. UDOT is currently installing DSRC (Dedicated Short-Range Communication) infrastructure along this corridor, using hardware from multiple vendors, and is enhancing and deploying a DSRC-based V2I application for transit signal priority, the first operational use of the Multi-Modal Intelligent Traffic Signal System (MMITSS). The connected vehicle system will be fully operational by Spring 2017.

All intersections along the Redwood Road corridor, and most adjacent roadways, are connected to a robust fiber optic communication system, facilitating efficient traffic management and data collection. In addition, all of these intersections have advance traffic sensor technology and signal performance metrics, making it possible to evaluate traffic conditions and impacts at all times. Third-party probe data provides real-time and historical data to augment the in-place sensors. UDOT's innovative GIS-based crash data mapping system and progressive weather

monitoring and prediction system provides robust historical information along the corridor, allowing entities to assess traffic conditions and impacts on various technologies.

UDOT will work with all qualified entities to facilitate AV testing along the Utah CAV Proving Ground, but the unique characteristic of this proving ground is the robust CV capability – DSRC infrastructure, multiple hardware vendors, fiber communication, signal performance metrics, and historical traffic, crash and weather data. We offer what many other locations cannot – an operational DSRC system on a public street with a variety of traffic conditions, supported by robust data to assess performance. UDOT invites transportation agencies and interested private companies to come use this facility, share resources and data, and participate in advancing CAV technology.

The Utah Connected and Automated Vehicle Proving Ground provides assets and conditions different from other test sites – an operational DSRC system on a public street, hardware from multiple vendors, rich data resources, and a sharing environment.

For twenty years UDOT has been known as an innovator in transportation technology, with Automated Traffic Signal Performance Measurements (ATSPM), public-private fiber optics deployments, diverging diamond and continuous flow interchanges, accelerated bridge construction, design-build construction, and a willing contributor to the transportation community. UDOT has a transparent approach, as evidenced by our sharing of the ATSPM development and data: live signal performance data is provided on a public website; the web platforms developed by UDOT have been shared with 17 agencies across the country; and our software is now included on the USDOT Open Source Application Development Portal (OSADP) software platform. Together, as agencies across the country, we believe we can collaborate to advance transportation into the future. We look forward to offering our Utah Connected and Automated Proving Ground to a diversity of partners - public and private - and to working collaboratively with them and our federal partners within a Community of Practice, on this disruptive and transformational technology.

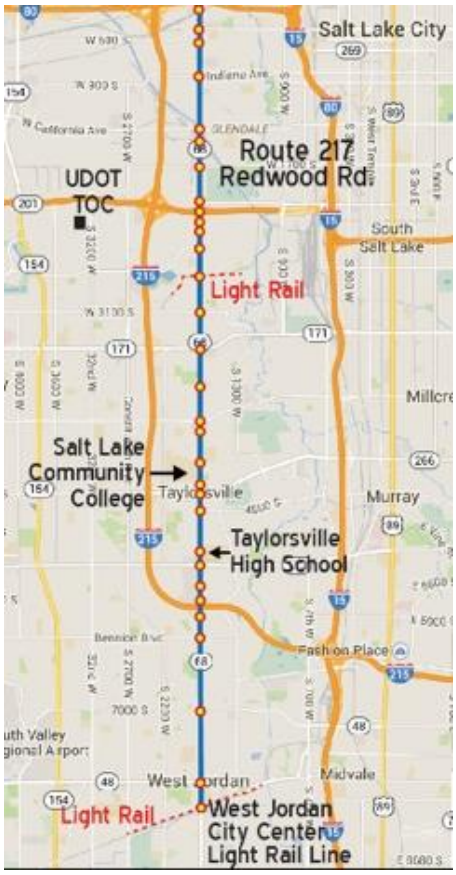
As part of our participation in the Community of Practice, UDOT proposes to sponsor an annual workshop on connected automation, to solicit partners as workshop co-sponsors, and to post data and best practices to a Proving Ground website. The connected automation workshop would include demonstrations by UDOT and other entities who are testing CAV systems, either on the Utah CAV Proving Ground or on other facilities, as well as presentations and panel discussions. The goals of the workshop would be to share lessons learned, best practices, and safety management techniques, and to foster collaborations and partnerships to advance this technology. The first workshop would be held in early 2018.

In their recent Notice of Proposed Rule Making (NPRM) on V2V requirements for light vehicles (Docket No. NHTSA-2016-0126, December 123, 2016), NHTSA stated that the "fundamentally different, but complementary, information stream provided by V2V", as compared to on-board sensors, has the potential "to significantly enhance the reliability and accuracy of the sensor-

based" systems. While this NPRM is exclusively about V2V systems, we believe that DSRC-based connected vehicle systems, including V2V, V2I, and V2X, are valuable and critical components of connected and automated vehicles and that the connectivity systems should be tested along with the automated elements. The Utah CAV Proving Ground is a unique, arterial corridor that provides an ideal environment for this purpose. UDOT offers our support and commitment to make this Proving Ground a successful element in the national effort.

THE UTAH CONNECTED AND AUTOMATED VEHICLE PROVING GROUND

Proving Ground Description



UDOT is excited to be part of a national network of connected and automated vehicle proving grounds, and views this USDOT effort as a beneficial step in accelerating the life-saving technologies promised by vehicle automation. UDOT offers our 11-mile connected vehicle corridor along Redwood Road in Salt Lake City as the Utah Connected and Automated Vehicle Proving Ground. Redwood Road is a diverse north-south arterial corridor in the Salt Lake metro area. The Utah CAV Proving Ground traverses industrial areas, commercial districts, residential neighborhoods, and educational campuses. The corridor ranges from five lanes (two in each direction with a center turn lane) to seven lanes, and has 35 signalized intersections. Average annual daily traffic (AADT) ranges from 18,000 at the north end, which is less densely populated, to 40,000 at the south end, with a peak of 60,000 at the I-215 interchange. Trucks make up 24% of that traffic.

UDOT is currently installing DSRC infrastructure along this corridor, using hardware from multiple vendors, and is deploying a V2I application for transit signal priority. Thirty of these 35 intersections will have DSRC radios broadcasting Signal Phase and Timing (SPaT) and intersection geometry (MAP) messages, allowing buses to request signal priority when they are behind schedule. Having DSRC equipment from multiple vendors on the corridor facilitates validation of interoperability with various software applications and hardware configurations. This connected vehicle corridor will be fully operational by Spring of 2017. Procedures will be in place by September 2017 to approve and facilitate testing by other entities along the corridor. Later in 2017, when the FHWA and the Crash Avoidance Metrics Partnership (CAMP) release a limited version of the

connected vehicle Security Credential Management System (SCMS), UDOT will incorporate that system into the broadcasts along the corridor.

Utah's connected vehicle corridor will be operational by Spring 2017.

The UDOT fiber optic network traverses the entire Utah CAV Proving Ground corridor, and all traffic signals are connected to fiber. Traffic cameras, also connected to the fiber optic network, are installed at twelve locations along this corridor, which allow for monitoring of traffic conditions, incidents, and activities. Modern traffic signal controllers and radar detection enable robust data collection at the intersections along this corridor. Third-party probe data will provide real-time and historical traffic information. UDOT has been a national leader in the deployment of Automated Traffic Signal Performance Measures, a set of performance metrics created at Purdue University and adopted by AASHTO as an Innovation Initiative. These metrics allow for a detailed analysis of traffic conditions, and how an automated and/or connected vehicle reacts in the traffic stream.

Proving Ground Management

The Utah Connected and Automated Vehicle Proving Ground will be managed and operated by a dedicated team of transportation professionals, each with specific expertise in certain operational elements of the Proving Ground. While the team may be augmented in the future, the core management of the team will include:

Designated Point of Contact / Team Lead – Blaine Leonard, P.E.
Mr. Leonard is the UDOT Technology and Innovation Engineer, a senior level management position within the Traffic Management Division responsible for new transportation technology, including automated and connected vehicles, emerging methods of traffic detection, data sharing, and innovative traffic safety tools. He manages collaboration with other agencies on electric and hydrogen vehicles, smart city technologies, and transit efficiency. Blaine is highly engaged in national committees and panels focused on connected and automated vehicles. He is the Chair of AASHTO's Connected and Automated Vehicles Technical Working Group, a member of the Executive Committee of the Vehicle to Infrastructure Deployment Coalition (V2I DC), and a member of the Connected Vehicle Pooled Fund Study. Within AASHTO, he is co-leading the national "SPaT Challenge", an effort to get state and local agencies to deploy DSRC infrastructure along a corridor in every state to broadcast the SPaT and MAP messages. Within the V2I DC, he is part of a small group engaged in ongoing discussions with the automaker community regarding data sharing and application collaboration. Blaine has developed working relationships with many federal, state, institutional and private entities in the connected automation field, and is committed to collaboration and innovation with this evolving technology.
Designated Safety Officer – Robert Miles, P.E.
Mr. Miles is the UDOT Director of Traffic and Safety. In this role, he supervises the Department's efforts in all aspects of traffic safety, including Utah's Zero Fatalities Program, school and pedestrian safety, traffic safety operations and projects, traffic signage, lighting and signal design, and railroad safety.

With twenty years of experience in the Department, including past responsibilities for transportation operations, encroachment and access permits, and preconstruction, Robert brings broad experience in traffic safety and risk management to the Proving Ground team. His Traffic and Safety group produces extensive crash statistics reports, operational safety reports, traffic studies, and work zone safety programs, and is involved with various regulatory programs such as MUTCD. Robert is involved in various national committees through AASHTO and TRB, where he contributes to, and participates in discussions and decisions about traffic safety issues.
Designated Technical Resource – Charles Felice
Mr. Felice is a software project manager at UDOT. He is fully conversant with the ITS technologies deployed around the state and has working knowledge of data structures; traveler information websites and mobile applications; communications modes; video systems; and ITS hardware configurations. Chuck is involved with the deployment of DSRC on the Redwood Road corridor, and has been responsible for creation of the intersection MAP messages. An experienced software engineer and project manager, Chuck has fourteen years of experience at Novell and and ten years at UDOT.
Designated Communication Resource (Fiber Network) – Lynne Yocom
Ms. Yocom is the Fiber Optic Manager at UDOT, and is responsible for installing and maintaining the broad fiber network throughout the state. She has leveraged public-private partnerships to share right-of-way and fiber capacity with almost twenty private telecommunications companies, doubling the reach of UDOT's fiber system. Lynne's expertise in building out fiber networks is sought for by agencies around the country. In addition to her fiber optic knowledge, Lynne is a software and network systems expert. She will facilitate the collection of data for various users of the Proving Ground using the fiber network.
Designated Data Analytics Resource – Jamie Mackey, P.E.
Ms. Mackey is UDOT's Statewide Signal Engineer. Jamie has been with UDOT for five years, and is the creative engine behind the innovative Automated Traffic Signal Performance Measures, developing additional algorithms, data visualizations, and operational implementations for the system. She will advise users of the Proving Ground on the uses of data to interpret the effectiveness of various applications and processes.
Designated Application and Visualization Developer – Derek Lowe
Mr. Lowe is a software developer, part of UDOT's team responsible for application development, data analysis, and data visualization. Derek has been responsible for the software development behind UDOT's Automated Traffic Signal Performance Measures and recently brought the software into compliance with the requirements necessary for it to be posted on the USDOT OSADP.

Workshop and Information Sharing on Connected Automation

A key element of any Proving Ground facility is the ability to foster collaboration between participants and share data, lessons learned, safety management plans, and best practices with interested parties. UDOT proposes two mechanisms to help achieve this goal; an annual workshop on connected automation and a dedicated Proving Ground webpage.

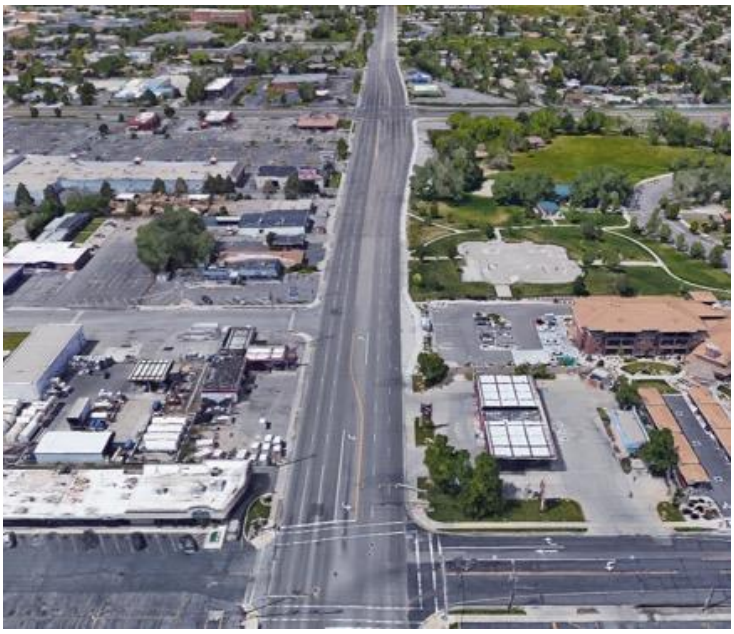
UDOT is excited to be part of a network of Proving Grounds and a participant in the Community of Practice. As a contributor to this community, UDOT proposes to sponsor an annual workshop

on connected automation, and to solicit partners as workshop co-sponsors. This workshop would include demonstrations by UDOT and other entities who are testing CAV systems, either on the Utah CAV Proving Ground or on other facilities, as well as presentations and panel discussions. Safety management plans would be shared and discussed. Data would be analyzed and evaluated. Applications would be demonstrated and reviewed. The goals of the workshop would be to share lessons learned and best practices and to foster collaborations and partnerships to advance this technology. The first workshop would be held in early 2018.

UDOT proposes to sponsor an annual connected/automated vehicles workshop to highlight lessons from the Utah CAV Proving Ground and related facilities.

In addition to the workshop, UDOT will host a webpage focused on the Utah CAV Proving Ground. The website will include a description of the Proving Ground features, processes for gaining access to the Proving Ground, a message board, and results of various tests, as available.

UDOT is accustomed to sharing data and participating in collaborative ventures. Over the past three years, UDOT has implemented an Automated Traffic Signal Performance Measurements (ATSPM) system which has become a national model for traffic signal management. This live and archived data is shared on a public website, and the web platforms developed by UDOT have been implemented by 17 agencies across the country with more to come. The ATSPM system was selected as an AASHTO Innovation Initiative, and is currently an FHWA emphasis area in Every Day Counts 4. The ATSPM software is now on the USDOT OSADP. UDOT collaborated with the National Operations Center of Excellence (NOCoE) in early 2016 to provide a three-day workshop on the ATSPM that was attended by 169 traffic signal professionals from 85 public and private organizations.



SELECTION CRITERIA

The Solicitation of Proposals provided a description of the selection criteria, including some mandatory criteria. This section describes how the Utah Connected and Automated Vehicle Proving Ground meets each of the mandatory criteria and provides value in many of the other criteria.

Mandatory Criteria

- *Designated Safety Officer.*
  - Robert Miles, P.E., UDOT Engineer for Traffic and Safety, will serve as the Designated Safety Officer. He and Mr. Leonard will participate in Community of Practice meetings.

- *Commitment to sharing the entity's approaches to safety and safety data generated through testing and operation.*
  - UDOT is committed to sharing with the transportation community, both public and private, our approaches and advances in safety, operations, and innovation. UDOT has a proven record of transparency and sharing, including the public-facing ATSPM website and available source code, lessons learned in Accelerated Bridge Construction, and other innovations.
  - Safety will be a primary consideration on the Proving Ground. UDOT will develop a Safety Management Plan for the Utah CAV Proving Ground, to ensure that the testing has no negative safety impacts on the public, and create a Risk Register. We will share these tools with the Community of Practice and post them on the proposed webpage.
  - UDOT proposes to host an annual Connected Automation Workshop to share safety management data, practices, and lessons learned, along with other results of testing on the Proving Ground.

Proposed Contributions

- *Extent to which the applicant meets the above eligibility and administers an established AV program.*
  - UDOT meets the mandatory criteria, as described above.
  - UDOT is currently building an operational connected vehicle project in a busy, live-traffic corridor. DSRC devices on the roadside and in buses, operated in partnership with the Utah Transit Authority, will be used to operate a smart transit signal priority application originally prototyped by the FHWA and the Connected Vehicle Pooled Fund Study, the Multi-Modal Intelligent Traffic Signal System (MMITSS). The MMITSS system includes several applications defined

in one of the mobility bundles under the US DOT's Dynamic Mobility Application (DMA) program, as described in the Connected Vehicle Reference Implementation Architecture (CVRIA). As part of UDOT's deployment of MMITSS, UDOT has modified the code to make it operable on multiple hardware platforms and has developed key modules to determine whether the bus is on schedule and to communicate beyond the current intersection. UDOT's deployment will be the first operational implementation of the MMITSS system.

- UDOT has hosted a demonstration of a connected automation system: truck platooning. Peloton, a California-based company, has brought their system to Utah on several occasions, and demonstrated the system in November 2015 on I-80 in Western Utah. Peloton and UDOT worked with the Utah Legislature to update state law to make this testing possible.

- *Capability of the applicant to provide leadership in making national and regional contributions.*
  - UDOT has made national contributions in a variety of transportation technologies, including design-build, innovative intersections, road weather operations, and the Automated Traffic Signal Performance Measurements system. Executive Director Braceras and Mr. Leonard are leaders in several national connected and automated vehicle committees and organizations, and have influence on research, policy and practice in the CV and AV fields.

UDOT has a culture of innovation and is known for bringing new transportation ideas into practice.

- *Applicant's proposed contributions to the Community of Practice.*
  - UDOT commits to actively participating in the Community of Practice established by the USDOT, including sharing the Safety Management Plan and Risk Register. We also propose to host an annual workshop on the topic and a website. Data from the corridor, including existing traffic, crash and performance data, will be openly shared. Any software developed by UDOT for use on the Proving Ground will be shared with interested parties.

- *Ability and willingness to maintain a working relationship with the Department's relevant research program offices*
  - Mr. Leonard has recently taken on a new senior level role at UDOT, as Technology and Implementation Engineer, with a specific focus on traffic management and safety technologies. He is familiar with personnel in the ITS JPO and at TFHRC, and currently works with them on various connected vehicle programs. As described above, he chairs or is otherwise involved with numerous national committees, and frequently attends conferences and workshops related to CV and AV. Mr. Leonard participates in several NCHRP Panels on CV and AV topics, and works with

personnel at TRB, the Texas Transportation Institute, and Southwest Research Institute. He and Mr. Miles will participate in the Community of Practice.

- The UDOT Traffic Management Division maintains an active working relationship with a variety of transportation researchers, including Dr. Darcy Bullock at Purdue University, Dr. Regan Zane at Utah State University, and Dr. Mitsuru Saito at Brigham Young University. UDOT is currently collaborating with the Center for Sustainable Electrified Transportation (SELECT) at Utah State University on electric vehicle systems, including in-pavement inductive charging systems.

Commitment to Safety

- *Demonstrated capability to control risks through implementation of robust safety precautions through a published safety management plan.*
  - One of UDOT's three Strategic Goals is "Zero Crashes, Injuries and Fatalities." UDOT is committed to safety, and will not rest until we achieve the "zero" goal. Utah's Zero Fatalities program has been implemented in several other states with which we share data and web applications, and operation of the Utah CAV Proving Ground will follow this pattern. Safety will be a primary consideration and UDOT will develop and share a Safety Management Plan, to ensure that the testing has no negative safety impacts on the public, and create a Risk Register.

- *Demonstrates that specific safety considerations have been met.*
  - The Utah CAV Proving Ground will adhere to all provisions of the Safety Management Plan and will operate within applicable laws and regulations.

Research, Application and Data Sharing

- *Extent to which the State can provide applicable solutions for the broader region.*
  - The unique characteristics of the Utah Connected and Automated Vehicle Proving Ground, with a specific focus on the role of V2V and V2I in vehicle automation, will provide valuable insights far beyond the borders of Utah. The MMITSS V2I application has been deployed as a proof of concept in Arizona and California, but has not yet been deployed for full operation. The entities involved in Arizona, California, and the other states involved in the Connected Vehicle Pooled Fund Study, are anxious to learn from the results of this deployment. Further, one of the Connected Vehicle Pilot Deployment sites intends to deploy a similar transit priority system, and Columbus, the smart city site

selected by the USDOT earlier this year, has transit priority listed in their application. Beyond MMITSS, the deployment of DSRC infrastructure is of interest to many state and local agencies planning to respond to the AASHTO SPaT challenge. Lessons learned from the Utah CAV Proving Ground will be welcomed around the country.

- *Demonstrated research and extension resources available.*
  - In addition to the national and local research relationships mentioned earlier, UDOT maintains an active transportation research program, including an annual prioritization workshop involving the local research universities and other public and private entities. The UDOT Research Division will be engaged in the operation of the Proving Ground, and their resources leveraged, as needed, to maximize the efficiency and benefits of the Proving Ground.

- *Degree to which applicant can disseminate results of research.*
  - In addition to participation in the Community of Practice, UDOT is proposing to host an annual workshop based on work performed at the Utah CAV Proving Ground and other facilities, and to share relevant data, research, and findings on a website.
  - Technical papers and presentations will be prepared for submission to TRB and other relevant venues discussing the operation of the Utah CAV Proving Ground and lessons learned in testing within this corridor.

- *Commitment to open data and sharing performance metrics.*
  - UDOT has a reputation for data transparency. One evidence of this transparency is the fact that the UDOT ATSPM website, showing live performance data, is available to the public without a login. UDOT commits to openly sharing data, performance metrics, and test results from the Proving Ground.

<u>Demonstrated Investments</u>

- *In facilitating AV testing, applicants demonstrate commitment through one or more:*
  - Capital improvements to the Utah Connected and Automated Proving Ground corridor are underway. DSRC infrastructure is being installed and the MMITSS V2I application is being deployed in a partnership with the Utah Transit Authority.

  - As described below in the "Adherence to Laws" section, UDOT has partnered regularly and successfully with the Utah Legislature on laws and regulations related to connected and automated vehicles.
  - In addition to the DSRC deployment underway, UDOT is testing a connected vehicle weather probe application in northern Utah in a partnership with two private trucking fleets.

Readiness

- *Designated facility is open for testing, or will be open for testing by January 2018.*
  - The Utah CAV Proving Ground will have full DSRC deployment, broadcasting SPaT and MAP messages by the Spring of 2017. The Proving Ground Management Team will have procedures in place to offer testing opportunities to other parties prior to September 2017.

- *Facility supports testing by multiple users, or the data generated by the proving ground is shared openly to the public.*
  - The Utah Connected and Automated Proving Ground will be open to any public or private entity that meets the regulatory and safety criteria established by the Management Team. This corridor is a public street; as long as these criteria are met, testing will be possible. UDOT operates in full transparency. Any data available on this corridor will be shared with all relevant parties, including the public. Data resulting from UDOT testing activities will be shared; sharing of testing data from other parties will be the responsibility of that party, but the Utah CAV Proving Ground website will be available for any such sharing.

- *Designated facility provides a Designated Point of Contact.*
  - Blaine Leonard, P.E., UDOT Technology and Innovation Engineer, will serve as the Designated Point of Contact.

- *If making use of public roads, the applicant demonstrates that it has engaged with any affected communities and can show that it is actively working with those communities to address any concerns.*
  - Redwood Road, the site of the Utah CAV Proving Ground, is a state road, operated and maintained by UDOT. UDOT has an ongoing and collaborative relationship with the counties and cities throughout the state, specifically to facilitate our ATMS network and signal interconnectivity (all transportation agencies in Utah use a common traffic signal management system). We also have close working relationships with the Wasatch Front Regional Council, the local MPO, and other MPOs in Utah.

Adherence to Laws, Regulations, and Federal Policy

- *Degree to which the facility will adhere to all state and local laws and federal regulations.*
  - UDOT will adhere to applicable laws and regulations in the operation of the Utah CAV Proving Ground, and will work with applicable state agencies and the Utah Legislature, if necessary, to facilitate safe and efficient testing.
  - UDOT has worked with the Utah Legislature on several issues related to connected and automated vehicles. In the 2015 session, we participated in changes to the

"vehicle following law" to facilitate truck platoon testing. In the 2016 session, we successfully worked on legislative changes to data regulations, making it possible to obtain third-party traffic data from probe vehicles. Later in 2016, UDOT and the Department of Public Safety made a report to the Legislature on the future of Automated Vehicles in Utah, and had an encouraging interaction with legislators about the benefits of AV.

- *Demonstrates adherence to those primary subject areas outlined in the NHTSA Policy for Automated Vehicles*
  - Testing of Automated Vehicles operating at Levels 1 and 2 is legal in the State of Utah since the human driver is in control of the vehicle and aware of operational situations. If manufacturers or other entities propose to test vehicles at Levels 3, 4 or 5 on the Utah CAV Proving Ground, UDOT will have an application process in place which essentially follows the recommendations made by NHTSA in the Federal Automated Vehicles Policy, published in September 2016. This process will include requirements that the vehicle comply with NHTSA's Vehicle Performance Guidance and applicable Federal Motor Vehicle Safety Standards, and the applicant present evidence of appropriate qualifications and insurance. Operational restrictions will be considered to maximize the safety of the tests, and consideration shall be given to whether a human will be in the driver's seat.

SUMMARY

In July 2016, NHTSA Administrator Dr. Mark R. Rosekind, stated, "We see a future where vehicle automation and vehicle connectivity could cut roadway fatalities dramatically". UDOT believes in the same future, expanded to include improved mobility and expanded opportunities. The synergy of automated vehicles and connectivity will move us toward that vision. We offer the Utah Connected and Automated Vehicle Proving Ground as an ideal vehicle to demonstrate, test, share, and improve these technologies, and we look forward to collaborating with the USDOT and many other public and private entities in this endeavor.