



MDOT'S AUTOMATED VEHICLE RESEARCH AND PRODUCTION CORRIDOR

Application for DOT-OST-2016-0233, Designation of
Automated Vehicle Proving Grounds Pilot





Maryland Department of Transportation
The Secretary's Office

Larry Hogan
Governor

Boyd K. Rutherford
Lt. Governor

Pete K. Rahn
Secretary

December 19, 2016

The Honorable Anthony Foxx
Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington D.C. 20590

Dear Secretary Foxx:

The Maryland Department of Transportation (MDOT) is pleased to submit an application to designate the Interstate 95 (I-95) Highway Corridor as an Automated Vehicle Proving Ground in Maryland per the U.S. Department of Transportation's Solicitation of Proposals for Designation of Automated Vehicle Proving Grounds Pilot (Docket Number DOT-OST-2016-0233). Highly autonomous vehicles (HAV) are developing quickly and we are looking ahead into the future to foster the innovation and implementation of HAV technology by taking the necessary steps to prepare for these vehicles operating within our state and the mega-region.

Maryland is a vital part of the I-95 corridor and is currently a hub of HAV technology research and development. So far, Maryland is home to incubation and development of private sector HAV companies with potential for a lead role in manufacturing. Additionally, Maryland is also home to a concentration of strong academic partnerships to support continued advancement through University of Maryland and Johns Hopkins University Applied Physics Laboratory.

The testing of HAV technology now has become crucial to keep up with the rapid developments in the automotive industry which is set to release high level automated vehicles to the public in the next several years. The I-95 corridor in Maryland includes significant Maryland Transportation Authority assets such as the Fort McHenry Tunnel, and as Chairman of the Authority, I believe this designation will allow MDOT to leverage public and private sector investments already made throughout the length of the corridor.

My telephone number is 410-865-1000
Toll Free Number 1-888-713-1414 TTY Users Call Via MD Relay
7201 Corporate Center Drive, Hanover, Maryland 21076

The Honorable Anthony Foxx
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Thank you for your consideration of this proposal. Should you have any questions or concerns, please contact Nicole Katsikides, Deputy Director, Office of Planning and Preliminary Engineering, Maryland State Highway Administration at 410-545-5511, or email at nkatsikides@sha.state.md.us. Ms. Katsikides will be happy to assist you.

Sincerely,

A handwritten signature in black ink, appearing to read "Pete K. Rahn". The signature is written in a cursive style with a large initial "P" and "K".

Pete K. Rahn
Secretary

Enclosure

cc: Ms. Nicole Katsikides, Deputy Director, Office of Planning and Preliminary Engineering,
SHA

Introduction

The Maryland Department of Transportation (MDOT) proposes Maryland's **Automated Vehicle (AV) Research and Production Corridor** (Corridor) for federal proving ground designation. The Corridor provides a "one stop shop" for innovation, testing and real world integration of automated vehicles. Our region is already rich with existing AV testing and hardware/software development, related AV cyber innovation, connected vehicle (CV) testing, and proposed manufacturing sites for CV and AV technology. The Corridor combines the wealth of expertise concentrated in the corridor with closed-loop facilities and designated testing sites on public infrastructure for real-world testing in a diversity of scenarios including intermodal freight and passenger operations.



Figure 1: MDOT's AV Research and Production Corridor, See Appendix A and D for more detail.

A key component to Maryland's Corridor proposal is the strong partnership for data sharing, best practices, advancements and partnerships that currently exists through MDOT's existing Autonomous and Connected Vehicle Working Group (AVCV Working Group) and partnerships with the University of Maryland Center for Advanced Transportation Technology Lab (CATT Lab) and I-95 Corridor Coalition (I-95 CC). The AVCV Working Group is a mix of public, academic, and private sector stakeholders and experts through which MDOT leverages ongoing technology research and development, AV partnerships for best practices and data sharing, and a diversity of public infrastructure testing scenarios, including intermodal, military and freight operations. And the CATT Lab has been a pioneer in collecting, analyzing, visualizing and sharing data through the use of its Regional Integrated Transportation Information System (RITIS), which has become a staple for interagency collaboration not just in Maryland, not just within the I-95 CC, but in other locations nationwide. RITIS is supported by a range of partners and resources currently active in the CV and AV realm and will be used to support the Corridor, see appendix H for more detail.

With expertise and a strong sense of governance and coordination, MDOT's Corridor is uniquely suited for development and implementation of new technologies and applications, facilitating data sharing and analysis, stimulating local production, and contributing substantially to the national body of knowledge and Community of Practice. More importantly, the Corridor includes private sector AV companies located within its boundaries who have already committed to or are planning testing of AV technology on closed loop and public infrastructure - we come to the table with an initial list of partners already lined up.

MDOT's Concept: Automated Vehicle Research and Production Corridor

Maryland's proposal takes advantage of existing development, testing, partnerships, and investment in AV technology currently concentrated along I-95 corridor. The Corridor is not just one interstate, I-95. It is a broad location that includes multiple roadways and facilities for diverse testing opportunities, as well as a strong data sharing, safety oversight, and technology acceleration components through formal, structured coordination with subject matter experts.

One Stop Shop – Development, Testing, and Production

Maryland proposes the AV designation along the I-95 corridor from the Aberdeen Proving Ground region just north of Baltimore, to the Fort Meade and University of Maryland region in the Washington, D.C. metropolitan area. Maryland's proposed corridor is a **"one stop shop"** for the development, testing, and implementation of AV technology and provides the environment for AV to go from inception to implementation and manufacturing using established facilities and expertise.

Several private sector entities in this corridor are already working with major domestic and foreign automakers to develop AV hardware and software components, many in the level 3 to 5 range of HAV implementation. Others are advancing to manufacturing for defense and commercial products and have had success in supporting AV technology in marine and naval defense applications for some time now.

Testing is already underway on private and defense-related closed course properties. For example, the Federal Highway Administration (FHWA), Aberdeen Proving Ground's (APG) Army Research Lab (ARL), and private sector businesses are currently testing CV and AV technology on the APG vehicle testing facility. FHWA is also outfitting other facilities such as the Federal Law Enforcement Training Center (FLETC) along the Corridor for testing. The Maryland Center for Entrepreneurship (MCE) and Gateway facilities in Columbia are currently supporting incubation and testing of AV cyber components. Additionally, MDOT has a strong history of safe and high tech testing of connected vehicle (CV) components on closed course areas like the Crofton Capitol Raceway in the corridor and on public infrastructure.

In addition to these closed-course settings, MDOT has designated specific sections of public infrastructure in the Corridor for AV testing including I-95, US 1 and others, as well as the Port of Baltimore and Baltimore Washington International Thurgood Marshall Airport (BWI) for AV use in operations testing.

MDOT's Corridor provides:

- ***Foundation of Public and Private Sector AV Expertise and Partnership*** - There is currently a concentration of AV applications from defense-related activities at APG and related cybersecurity expertise at Fort Meade to national academic leadership in AV.

- **Formal Collaboration is in Place** - The corridor has an established partnership and governance structure to foster collaboration through MDOT's AVCV Working Group of public and private sector stakeholders.
- **Niche Opportunities for Intermodal Freight and Passenger Operations**- The Corridor includes unique opportunities for intermodal freight and passenger AV testing. This includes port, intermodal and distribution center activity, as well as a passenger links to MARC Commuter Rail, Amtrak, other mass transit and parking. MDOT is currently having initial dialogue with Corridor-based companies to test AV with airport operations.
- **Maryland DOT Expertise and Success in ITS, CV and AV** - Maryland has demonstrated expertise in ITS, CV and AV technology testing and implementation and has several highly coordinated functions engaged in advancing this technology with proven adherence to safety and data collaboration.

The I-95 Corridor in Maryland is a corridor of national significance that presents numerous transportation scenarios and challenges - a transportation operations engineer's dream come true – where AV can be tested comprehensively. Key highlights include:

5 major North/South Routes	8 major East/West Connecting routes
235 State-Operated Signal. Interchange	Major, Post Panamax Port
International Airport	National Security Assets
Congressional Visibility	Major Retail Distribution Centers
Multimodal Transit Options	

The Corridor is the transportation backbone of the fourth largest marketplace in the U.S., and the epicenter of a \$4.7 trillion economy (40% of US GDP) and 28% of all U.S. exports. At its southern tip is the global center of political influence (Washington, D.C.). To the north is the port city of Baltimore where in 2014, 29.5 million tons of international cargo worth over \$52 billion crossed its docks. The port is directly linked to 108,000 jobs in Maryland, and it set the record for highest number of vehicles among all US ports for the fourth consecutive year. To the east is Annapolis, the state Capital of Maryland and the home of the U.S. Naval Academy and military operations.

Without improvements, it can also be a nightmare for freight, commuters, and other travelers. Mean travel times to work within the Corridor counties are higher than in the rest of MD, D.C., and Northern VA combined. Congestion along the corridor continues cost motorists \$1.185 Billion. Combined with existing AV development at military installations, private sector facilities, and academic campuses, MDOT's Corridor provides ample, diverse scenarios for public sector simulated environment and real world testing – true **one stop shopping** for AV development. It is also primed for the manufacturing of AV component technology, which is planned within the next two years.

MDOT's Tiers for AV Development to Manufacturing

Maryland has identified a three-tiered approach to fostering AV technology development, testing and deployment in the proposed corridor.

Tier I – Relies on existing development & testing occurring at Aberdeen Proving Ground, Maryland Center for Entrepreneurship, private companies and academia. It provides for development and testing in closed course and simulated environments that are highly controlled.

Tier II – Relies on MDOT-owned public facilities to test both in a simulated environment and real world experience. It is supported by MDOT's CVAV experts to ensure safety and high levels of data sharing.

Tier III – Relies on existing private sector efforts combined with public sector resources and infrastructure to support the rapid manufacturing of software and hardware components that is beginning to occur in the region.

These tiers and the wealth of existing AV activity within the corridor are described below.

TIER I: DEVELOPMENT AND SIMULATED ENVIRONMENT (CONTROLLED, CLOSED COURSE)

Tier I facilities are existing facilities, as well as several proposed or facilities in development, that are currently used and will be used for AV development and simulated environment testing. These are facilities and companies where prototypes and analytics are built and tested under controlled conditions prior to testing and deployment in a real-world environment. These include:

Army Research Lab	Maryland Center for Entrepreneurship
Private Industry	University of Maryland (UMD)
UMD Autonomous Vehicle Lab	UMD CATT LAB
Johns Hopkins Applied Physics Lab	Morgan State University
Maryland Cybersecurity Center	National Transportation Center

Army Research Lab Vehicle Technology Directorate

At the northern terminus of the corridor, APG is leading technological advancements through work at the Army Research Lab (ARL) Vehicle Technology Directorate (VTD). The ARL accommodates numerous private sector tests of AV technology, as well as CV and AV testing currently being conducted by FHWA, which uses the APG facility due to its advanced vehicle testing infrastructure. Numerous private sector partners in the APG area support work at the ARL. MDOT is currently engaged in initial, information sharing with APG ARL and FHWA about testing. For more information on specific work in the VTD, Autonomous Systems Division (ASD), please see Appendix C.

The Maryland Center for Entrepreneurship (MCE)

In the central region of the Corridor, the Maryland Center for Entrepreneurship (MCE) is an incubator of AV technology and Maryland businesses currently excelling in the AV sphere. The MCE, an initiative of the Howard County Economic Development Authority, leverages its position in the heart of the Baltimore-Washington metropolitan corridor to deliver best in class resources and services. The MCE provides a robust, interactive community of innovators, entrepreneurs, investors and advisors collaborating to successfully ignite innovation and launch high-growth, technology-based companies in an entrepreneurial ecosystem abundant with resources. Through MCE's Innovation Catalyst Program (iCAT), AV entrepreneurs are already working with the MCE, and MCE is supporting AV development and testing currently with broader scope planned in spring 2017.

University of Maryland

Located at the southern end of the corridor, the University of Maryland (UMD) is a national leader in the development of transportation technology. MDOT partners with UMD for its Intelligent Transportation Systems (ITS) and data sharing platforms, as well as for research and advancing of ITS systems and

concepts. UMD is supporting AV work within the corridor through its Autonomous Vehicle Laboratory, Center for Advanced Transportation Technology Laboratory, Maryland Cyber Security Center, and National Transportation Center.

Autonomous Vehicle Laboratory

The Autonomous Vehicle Laboratory (AVL) is a facility in the University of Maryland Department of Aerospace Engineering. The AVL educates students studying for BS, MS, and PhD degrees in the multi-disciplinary area of biologically inspired autonomous robotics. The AVL also pursues applied research, especially in the prototype development of biologically inspired autonomous vehicles for civilian and military applications. The AVL facilities have unique capabilities including rapid-prototyping facilities for microsystem fabrication and development and a marker-based visual tracking system that provides direct measurements of vehicle position and orientation for system identification and real-time feedback.

Center for Advanced Transportation Technology Laboratory

The CATT Lab is the largest transportation data analytics and situational awareness applied R&D laboratory in the world—amassing over 1-trillion transportation data points every single day from hundreds of public and private sector systems. The lab is staffed by an interdisciplinary group of 100+ engineers, software developers, researchers and students with diverse transportation operations, planning, research, and applied/real-world technology skillsets. The Lab develops innovative technology deployments and user-centered design of software and information visualization systems. These systems and their data are used by nearly 10,000 transportation professionals, the military, leading private sector firms like Google/WAZE, GM, INRIX, TomTom, and HERE, plus millions of travelers. The work spans many disciplines including Intelligent Transportation Systems, Automated Vehicles, law enforcement, network security, private business, defense and homeland security. CATT Lab staff are experts in database management systems, big-data technologies like Hadoop, standards, geospatial data management, data processing optimization, and information visualization.

MDOT will leverage the CATT Lab's data and analytical applications to support data sharing and performance metrics for AV testing. Because of the CATT Lab's national reach and big-data systems, data collected within our Corridor can be shared in real-time with 3rd parties around the country (with appropriate agreements in advance that recognize and respect intellectual property and proprietary systems). Archived data will also be made available in various analytics tools to help researchers and developers understand the implications of connected and autonomous vehicle technologies while testing various hypothesis. Leveraging nearly \$40M in prior investments, the Lab's data platform could also be made available to other proving grounds around the country—saving significant resources and providing enhanced data and analytics capabilities to tens of thousands of interested parties.

Maryland Cybersecurity Center

The Maryland Cybersecurity Center (MC2), created in late 2010, is an academic center on the University of Maryland campus that brings together faculty, researchers, and students working in the field of cybersecurity from several schools and departments across campus. Their proximity to the nation's capital enables close interaction with federal agencies, and their location in the Maryland-DC-Virginia region - one of the leading areas in the country for cybersecurity innovation and job growth - makes MC2 an ideal place for technology development and partnerships with industry. MC2, along with CATT and the National Transportation Center at UMD, are currently

working with the Ford Motor Company through a strategic partnership agreement on data analytics and cybersecurity related to Autonomous Vehicles. As a result, an AV cybersecurity lab has already been established for testing on real-world vehicles.

National Transportation Center at the University of Maryland (NTC@Maryland)

NTC@Maryland is one of only five National University Transportation Centers that were selected by US DOT in a 2013 nationwide competition and the only one with a focus on the strategic goal of "Economic Competitiveness." NTC@Maryland focuses on research, education, and technology transfer activities that can lead to (1) freight efficiency and reliability; (2) congestion mitigation with multi-modal strategies; and (3) national level investment and policy analysis. In the Autonomous Vehicle research area, NTC@Maryland is a leader in studying the impact of AV technology and deployment on travel behavior, traffic flows, and economic development.

Johns Hopkins Applied Physics Lab

The Johns Hopkins University Applied Physics Laboratory (APL) is engaged in supporting military systems development for automated technology. Significant advancements are occurring at APL, as well as within the cyber realm. For example, work at APL terrestrial operating domain provides certain advantages as well as particular challenges in comparison to other domains. Perhaps the most visible ground autonomy work in the DoD today is being done by DARPA as part of the Army's Future Combat System. This work has again focused on vehicle design (the Unmanned Ground Combat Vehicle program) and off-road navigation, sensing, and mobility (the Perception for Off-road Robotics program).

Support Institutions

The following are three academic centers currently providing support to AV research and testing, and that would be key in supporting testing as technology develops.

National Transportation Center at Morgan State University

The National Transportation Center (NTC) at Morgan State University advances U.S. technology and expertise in transportation, research, and technology transfer, focusing on transportation as a key to human and economic development. The NTC's current areas of research focus are transportation and traffic modeling, safety, economics and equity, transportation funding, and infrastructure's effect on aquatic life. The NTC also works to increase the number of minorities and women working in the transportation field. A key research area for NTC staff is automated technology.

Cyber Security Academy at University of Maryland Baltimore County (UMBC)

Cyber expertise is critical for AV software development in the Corridor. UMBC Training Centers' Cybersecurity Academy provides highly focused skills training to address the cyber workforce needs of the Government and the commercial sector. Cybersecurity Academy courses and certificate programs combine multiple skills training and hands-on problem solving guided by expert instructors to create high-impact learning. The skills mastered in these programs prepare participants with immediate, on-the-job effectiveness to tackle real-world situations.

Towson University Center for Geographic Information Systems (GIS)

The Center for GIS (CGIS) is a professional organization staffed by highly qualified technologists dedicated to empowering government, businesses, and non-profits by making GIS technology accessible through innovative geospatial solutions including geospatial data development and analysis, application design and development, GIS integration, and GIS training. In our continuing efforts to promote

collaboration and coordination in the state of Maryland, Towson University works closely with Maryland's Geographic Information Office to support state agencies GIS activities and Maryland State Geographic Information Committee (MSGIC), working with MSGIC on several National Spatial Data Infrastructure Cooperative Agreement Program. MDOT already works with CGIS and will rely on their expertise to support geospatial analytical support of AV testing (mapping) in the Corridor.

Private Sector

MDOT is already in communication with several companies such as Battelle, Steer Tech, Local Motors, and Marine Applied Physics Corporation who are working in the AV space within the Corridor. Below are descriptions of some of the private sector firms in the corridor. See Appendix I for details.

Local Motors (<https://localmotors.com>): Local Motors ("LM") is a technology company that has decentralized and simplified the development, production, and commercialization of vehicles and has created the world's first 3D-printed vehicle, the Strati, and the world's first cognitive self-driving shuttle, Olli. The Olli uses over 30 sensors to enable L4/L5 automation and the advanced cognitive computing capabilities of IBM Watsons to allow direct interaction between riders and Olli. They are a member of the MDOT AVCV Working Group.

Tower Sec, Columbia, MD: TowerSec was a pioneer provider of Cyber Security solutions to the automotive industry developed in Howard County along the I-95 Corridor. In January 2016, HARMAN International Industries acquired TowerSec to form HARMAN's Automotive Cyber Security Business Unit, part of the company's Connected Car division.

STEER Tech, Columbia, MD: STEER Tech is focused on building the next generation software and technology that will be driving future vehicles and is a member of the AVCV Working Group.

Robotic Research, LLC, Gaithersburg, MD (www.roboticresearch.com): Robotic Research, LLC is a small engineering firm committed to finding innovative, cost-effective solutions in the areas of robotics, intelligent control, sensor processing and specialized computer programming. Robotic Research engineers design, develop, and test state-of-the-art autonomous mobility software. <https://mdbiznews.commerce.maryland.gov/2011/09/a-i-the-future-of-defense/>

Maritime Applied Physics Corporation (MAPC), Baltimore, MD, (www.mapcorp.com): MAPC has been at the forefront of the burgeoning field of unmanned vehicles for many years, ever since they helped prove the concept for the US Navy with the unmanned hydrofoil. Since then, they have done the same with surface vessels, personal watercraft, ground vehicles, and sailboats.

General Dynamics, Annapolis Junction, MD, (www.generaldynamics.com): Development and testing of autonomous technology. <http://www.generaldynamics.com/news/press-releases/2010/05/general-dynamics-robotic-systems-completes-successful-autonomous>

Battelle, Aberdeen, MD, (www.battelle.org): Battelle is well positioned to leverage its current capabilities by bringing their experience in CV research and development, AV Human Factors expertise, software development and prototype development and testing to Maryland's 1-95 corridor.

TIER II: REAL WORLD

Once initial development has been tested and evaluated in laboratories and on closed-circuit tracks, the next logical step is to begin evaluating CV and AV technologies in “real world” conditions. How will the technology function in the vicinity of non-CV/AV vehicles? Are there specific applications that can be tested on current roadways? How will the systems interface with the infrastructure? Will weather and pavement conditions impact the functionality? There are a number of use case studies that will need to occur in a semi-controlled environment (compared with a completely controlled environment of the laboratory) and Maryland's Automated Vehicle Research and Production Corridor provides the ideal variety of locations and conditions to continue that journey from development to production.

A key element of our approach is that we're not offering just one facility - just one location. There are a number of different locations along the Corridor that provide different functional and environmental conditions to suit whatever test situation is being pursued. While the list of facilities can and will likely increase throughout the life of the effort, an initial list of facilities includes the following:

Interstate 95

This access controlled highway features an incredible variety of potential conditions that can be evaluated. At its northernmost end of the Corridor I-95 is a tolled facility, featuring electronic toll collection technology compatible with large segments of the country (“E-ZPass®”). Close proximity to APG provides the opportunity to move to and from Tier I and Tier II testing simultaneously, and the Express Toll Lane segment just south of APG provides the opportunity for more controlled testing within certain time frames and limitations. A robust ITS infrastructure already exists along this northern section of roadway with CCTV and speed detection in place, connected to an existing fiber-optic backhaul telecommunication network capable of growing and evolving with the introduction of DSRC infrastructure. Parallel major arterials in the northern section include US 1 and US 40, which provide an opportunity to consider Integrated Corridor Management use case studies - with many of the signalized intersections already capable of centralized communication and enhancements.

At the southern end of the Corridor, I-95 not only features close proximity to Ft. Meade and the University of Maryland also features a robust ITS infrastructure and parallel major arterials US 1 and US 29. Interstate 95 is attractive as a test corridor for another very important reason: it is the lifeline of economic activity along the entire East Coast of the United States. Stretching more than 1,900 miles from Florida to Maine, this highway carries more than 35% of the nation's vehicle miles traveled on a daily basis and 5.3 billion tons of freight annually. ***As an original member of the I-95 Corridor Coalition, Maryland actively participates in data sharing and knowledge transfer alongside 34 other State DOT's and toll authorities. Utilizing the corridor in Maryland is akin to gaining access to the corridor from Florida to Maine.***

Major Arterial Roadways

In the northern portions of the Automated Vehicle Research and Production Corridor there are several major arterial roadways controlled by MDOT's State Highway Administration (SHA). Parallel to I-95 there is US 1 and US 40, and connecting all three is MD 24 and several others. The SHA already has telecommunication connectivity to a majority of signalized intersections in this area, and has replaced most of the signal controllers with state-of-the-art 2070 open architecture controllers (Econolite ASC/3) operated by Centrac software. Econolite is an active partner with the SHA and has expressed interest in testing some of its latest Cobalt controllers in the state which could provide more immediate access to signal phase and timing data.

In the southern portions of the Corridor, US 1 and US 29 are parallel to I-95 and provide access to a number of business, industry, and academic institutions including our key partners University of Maryland and Johns Hopkins Applied Physics Lab. Connecting all three are several arterial and limited access freeways, including MD 32 which runs right through Fort Meade. A majority of the signalized intersections in this portion of the Corridor also feature telecommunication connectivity and upgraded signal controllers. In addition, the SHA is preparing to implement a next-generation deployment along US 1 between MD 175 and I-195 that will feature fiber-optic backhaul connectivity, arterial CCTV and detection installation, and next generation Econolite controllers capable of providing Signal Phase and Timing (SPaT) and map data at the cabinet. The installation of Dedicated Short Range Communications (DSRC) for CV testing is also being considered as part of this deployment area, which is intended to become a blueprint for other future arterial upgrades statewide.

Other Corridor Roadways

In addition to I-95, there are other access-controlled highways in the corridor that would be made available as part of the Proving Ground resource menu including:

- I-195 that links several major North/South roads to the Thurgood Marshall Baltimore Washington International Airport, a hub for passenger and freight movement along the corridor;
- MD 100 that provides a unique East/West linkage between business, manufacturing, and residential locations in Anne Arundel and Howard Counties in the middle of the corridor;
- MD 200/Intercounty Connector, an ETC-only toll facilities that links I-95 to the high tech corridor and business interests along I-270 and the western portions of the state;

Port of Baltimore and Freight Operations Testing

The Corridor is a nationally critical freight corridor. The Port of Baltimore handled 32 million tons of cargo valued at \$51 billion in 2015. It is also linked to 127,000 jobs in Maryland and handles more autos and farm and construction machinery than any other U.S. port instead of just cars.

With the Port of Baltimore's strength in goods movement, as well as the I-95 corridor offering many intermodal and major warehouse/distribution facilities, the opportunity to test freight AV in a variety of scenarios and obstacles is available. MDOT, MDTA and MDOT Maryland Port Administration (MPA) will support AV truck testing at Port facilities as part of this designation.



Figure 2: Port of Baltimore and Adjacent Intermodal

Pending approval from homeland security entities for port access and any private operators, the Port of Baltimore is pleased to offer a real-world freight

AV testing scenario for both in and out truck operations, as well as drayage opportunities. The port provides a ready opportunity for this emerging technology to test and implement freight operations. The mid-Atlantic region is home to one of the most critical truck parking problems in the nation, as well as major driver shortage and congestion/delay issues for the trucking community. Testing and use of AV technology would address these major challenges and could lead to efficiencies in freight movement.

In addition to Port testing, the potential for AV truck testing exists along the Corridor due to a concentration of major retail warehouse and distribution facilities, truck parking facilities, and intermodal connections to Class I freight railroads. MDOT will explore these opportunities as AV truck technology develops.

Intermodal Passenger Testing at BWI

BWI is a major international and intermodal airport that services the Baltimore Washington Metropolitan Region. It has an average of 65,000 passengers a day and over 23 million commercial passengers every year, as well as significant military troop movement support. Some of the top airlines serving BWI are Southwest, American, Delta, United and Spirit with international carriers including Air Canada, British Airways, Condor and Norwegian. There are over 15 nonstop international destinations. BWI's excellent intermodal connectivity provides ample opportunities for AV testing. Figure 3 demonstrates the numerous parking and intermodal facilities as well as the traffic areas for the airport that are open for testing. BWI's shuttle system is an excellent opportunity that MDOT is already considering for AV technology and plans to test in the near future. Private sector partners have already inquired about the use of BWI for testing of CV & AV technology. There are a variety of AV opportunities MDOT's Maryland Aviation Administration (MAA) is interested in supporting from shuttle operations to parking to potential AV truck and air cargo opportunities. BWI is highly intermodal in that it is linked to the major I-95 Corridor directly, has linkages to Amtrak's Northeast Corridor, MDOT's MARC Commuter Rail, MDOT's light rail system, and a robust system of commuter buses and regional bus systems.



Figure 3: BWI Airport Operations Area

Additional Opportunities and Locations

MDOT is currently working with a number of private, academic and public testing facilities to arrange CV and AV testing such as the Maryland Public Law Enforcement Training Center, which offers a mock urban environment scenario, as well as other simulated environment facilities. Additionally, Howard County's Ellicott City and, Columbia and the Baltimore Regional Transportation Board (BRTB) (Baltimore regional Metropolitan Planning Organization (MPO) plan to partner with MDOT for downtown and urban testing scenarios. Resources available include:

1. Federal Law Enforcement Training Center (FLETC)(Cheltenham, MD): FLETC is already being used by the Army and FHWA for AV testing and is a 2.2 mile driver training range, including skid control, NEVO, highway response and urban grid.
2. Maryland Police and Correctional Training Commissions Public Safety Education and Training Center (Sykesville, MD): This facility provides mock city and traffic scenarios for testing.
3. Race tracks (i.e. Crofton Capitol Raceway): These facilities are currently used by the Maryland Transportation Authority for testing.

4. Howard County Gateway Facility: This facility is available immediately to support AV testing and has testing planned in next few months. It will allow for a variety of testing scenarios such as parking and other low speed operations.
5. Ellicott City and Columbia in Howard County: The County has proposed real world and semi-closed AV testing of downtown, mixed use atmosphere in partnership with its downtown development efforts.
6. Baltimore Metropolitan Planning Region/ BRTB: The BRTB is an advanced, high tech planning agency and a partner in MDOT's data sharing, ITS and CV testing and implementation. BRTB is supportive of urban scenario testing, mostly within Baltimore City but also throughout the Corridor as BRTB represents most of the jurisdictions along the Corridor.
7. Additional Opportunities: MDOT will continue to develop additional partnerships and testing opportunities throughout the Corridor. At the time of this application, several ideas were presented and are in discussion but are too new to include. These options include use of private development property in the Corridor and other state-owned infrastructure.

TIER III: CURRENT AND POTENTIAL MANUFACTURING

Completing the flow from the development to testing to manufacturing, our Corridor approach includes a robust industrialized environment that is attractive to a number of entities looking to test their AV technology. Sixty percent of Maryland's manufacturers are advanced – producing high-mix, low volume, high technology products. Using advanced materials, processes and machinery, companies develop heavily engineered, customized products such as sensors, unmanned and autonomous systems, medical devices, electronics and capital equipment.

Manufacturing of AV equipment is certainly an emerging area for Maryland, and Maryland is perfectly situated to support goods movement, workforce development and advancements in manufacturing. Currently, four companies along the corridor are already planning development and manufacturing of AV components within the next two years. Some of these companies are already developing and manufacturing AV components for military and marine functions. There are related companies just west of the corridor in Westminster but operating and testing within the corridor such as at the Port of Baltimore. Two of these local companies are testing marine AV components and related surface components in and around the Baltimore Inner Harbor region and have major contracts with the U.S. Navy and other defense entities. Additionally, manufacturing support entities like the Regional Additive Manufacturing Partnership of Maryland active within the Corridor is at the ready to support AV growth.

Though some of the manufacturing detail that this corridor would support is proprietary at this time, Maryland remains committed to continuing to support the advancement of automated business in the State and, specifically, the testing within the Corridor to advance and build this technology.

CRITERIA FOR DESIGNATION

Designated Safety Officer and Governance Structure

Maryland's Coordination of AV Testing will be led by a Designated Safety Officer supported by a strong governance structure that engages technical experts and provides a sharing forum for stakeholders. Maryland DOT proposes Ms. Nicole Katsikides, Deputy Director, Office of Planning and Preliminary Engineering, as our Designated Safety Officer and day-to-day Program Manager for the effort. Her diverse background in planning, freight operations, safety and transportation data and

analytics was a large reason why MDOT's State Highway Administration tapped her to lead their internal efforts for CV/AV.

Ms. Katsikides will draw support from a large pool of resources being made available for this effort by MDOT. As the Program Manager, she will report to an already established MDOT AVCV Working Group, where policy oversight and resource allocation will be governed. And, she will have a robust set of technical resources available from MDOT's AVCV Technical Working Group, which includes a diversity of expertise that represent engineering, safety, ITS, data management, and other disciplines. Most of these experts are already active in USDOT projects and forums, especially with the Federal Highway Administration Offices of Operations and Safety, as well as AASHTO, TRB, ITE, APTA, and ITS America - further expanding our already strong knowledge and data sharing capabilities. A full description of MDOT's Designated Safety Officer and program management structure, AVCV Working Group and AVCV Technical Working Group is included in Appendix F but briefly described below.

MDOT AVCV Working Group

MDOT has a Connected and Automated Vehicle Working Group led by the MDOT Motor Vehicle Administration Administrator Christine Nizer on behalf of Secretary Pete Rahn. In 2015, Maryland Transportation Secretary Pete Rahn established the Working Group as the central point of coordination for the development and deployment of emerging autonomous and connected vehicle technologies in Maryland. Secretary Rahn also charged this group with being the central point of strategic planning for MDOT's role with autonomous and connected vehicles. The Working Group includes a diverse group of transportation stakeholders, including elected officials, state and local agency representatives, nongovernmental organizations, representatives from the private sector and automotive industry. The group evaluates the latest research, tracks federal and state laws, policies and programs, and coordinates with other agencies, organizations and businesses to set the course for the future of automated and connected vehicles in Maryland. **See Appendix F** for the full list of current AVCV Working Group members.

MDOT AVCV Technical Working Group

A subgroup of technical representatives from the Working Group will oversee testing permitting, driver involvement, operations on Maryland owned infrastructure, data sharing and safety. A key element of the subgroup is to ensure safe procedures at all times on state-owned property, provide safety guidance for private testing, and negotiate with the testing entity for the safe and value added use of public infrastructure in return for data sharing and interface with the infrastructure. Maryland is interested in safety data as a priority but also desires to understand how the vehicle performed on public infrastructure, mobility data, and any other interface data that can be provided by the testing entity. But we also recognize there will sometimes be complicated intellectual property and proprietary issues to navigate through with private sector companies, and having a multi-disciplinary group of experts on this working group will assist in evaluating various scenarios for future cooperation more efficiently.

With the support of these expert policy and technical resources, Ms. Katsikides will manage the development and oversight of the overall Proving Ground Safety Management Plan. This plan will lay out the procedures and guidelines for testing in Maryland, recognizing that flexibility and innovation must be balanced with a focus on the safety of the practitioners involved as well as any non-participants given the fact that public roadways and facilities may be employed in testing. Strict adherence to communication and coordination policies will be required, but measured against the backdrop of fostering the advancement of concepts and technologies.

Data Sharing

Data sharing is a central component MDOT's approach. The collaborative structure is outlined in the governance of the Corridor, but for advanced data collection, analytics and sharing, MDOT will coordinate with the global leader, CATT Lab, through the existing RITIS program to integrate testing data from projects within the Corridor and provide a mechanism for analysis, visualization and sharing. Well over \$35M has already been invested in RITIS by homeland security, FHWA, MPOs, and 20 plus state DOTs. With significant support from MDOT, RITIS is an automated data sharing, dissemination, and archiving system that includes many performance measure, dashboard, and visual analytics tools that help agencies to gain situational awareness, measure performance, and communicate information between agencies and to the public.

RITIS automatically fuses, translates, and standardizes trillions of data points obtained from hundreds of agencies in order to provide an enhanced overall view of the transportation network. Participating agencies are able to view transportation and related emergency management information through innovative visualizations and use it to improve their operations and emergency preparedness. RITIS also uses regional standardized data to provide information to third parties, the media, and other traveler information resources including web sites, paging systems, and 511. Please see Appendix H for full details on RITIS features.

Proposed Contributions

The strength of the Corridor is that it offers a one stop shop approach to take AV from idea to through testing and ultimately to production - and that the expertise is here, currently innovating every day, and can make use of a diverse public infrastructure network for testing a range of scenarios, specifically for freight and intermodal passenger connections. As stated before – a transportation engineer's dream! Concepts can come to life in the corridor, and Maryland public and private sector stakeholders are cultivating a community of expertise to support growth in AV technology.

MDOT is fully committed to contributing to the Community of Practice. Through MDOT's Safety Officer, AVCV Working Group and its established and highly functioning RITIS data sharing mechanism, MDOT can efficiently and thoroughly collaborate with stakeholders, analyze performance and quickly disseminate information nationally.

MDOT has strong working relationships with peers in other states, in allied organizations and in the private sector through participating in the I-95 CC, American Association of State Highway Transportation Officials (AASHTO), the American Association of Motor Vehicle Administrators (AAMVA) and Transportation Research Board (TRB). Partner organizations such as our academic, defense and private sector partners also participate in the national CV & AV technology dialog and in the sharing of best practices and data. MDOT's AV Proving Ground structure will leverage all of these efforts and provide on-point information sharing, drive participation and ensure that the goals of the USDOT AV Proving Ground designation are met.

The Corridor includes access to a significant freight corridor and passenger intermodal facility with unique opportunities for freight and passenger AV testing in a range of scenarios including port operations and intermodal activities. As noted previously, MDOT offers its port facilities to test AV commercial vehicle operations in a port environment and BWI's operations, which are in work to accommodate testing by current companies in the corridor.

In addition, the corridor already has a high level of ITS and CV infrastructure and expertise in place to support AV development. The Coordinated Highways Action Response Team (CHART) is a joint effort of MDOT business units Maryland State Highway Administration (SHA) in partnership with the Maryland Transportation Authority (MDTA) and the Maryland State Police (MSP). Together, they represent the highway operations element of Maryland's Transportation Systems Management & Operations (TSM&O) Program. CHART blends advanced and innovative technologies with cooperative teamwork among different agencies in Maryland to provide safer, more efficient operations of the transportation system. CHART management responds to, anticipates and capitalizes on opportunities for cooperation with a wider and more diverse group of public agencies and private organizations so as to better fulfill its mission of: "improving mobility and safety of highway users through the application of ITS technology and interagency teamwork." A full description of other MDOT CV/AV activities is in Appendices E and G.

Commitment to Safety

MDOT's priority is safety. Through the Corridor's governance structure, any testing on state-owned facilities will pass a well-vetted permitting process and will identify key officials to participate in the testing and how the testing will comply with MDOT testing standards. MDOT was already in the process of identifying the procedures and review for testing on state-owned infrastructure before this solicitation came out. The AVCV Technical Working Group will identify all necessary safety procedures, signage, law enforcement, communication and other applications necessary. MDOT has a robust safety program along with other State partners like Maryland State Police. Additionally, MDOT's CHART program will provide its resources to monitor and ensure safety of any testing.

Research, Application and Data Sharing

RITIS is the Corridor's main outlet for data sharing and analytics described above. In addition, the Corridor has a demonstrated focus on research and testing at defense facilities such as APG, Fort Meade, academia and private sector contractors. These innovations have a high level of technology transfer from military and private sector to civilian applications. MDOT, in particular, has been a leader in research on transportation data, modeling, ITS and CV solutions.

Advanced Travel Demand Modeling and Simulation Capabilities

MDOT SHA has established itself at the forefront of several nationwide research and innovative project initiatives. Over the past few years, the agency has developed a cutting edge multi-resolution modeling system that leverages agency data, private sector data and big data sources to develop advanced behavior and network models to analyze transportation system performance and supply-demand interactions.

Since 2014, SHA has received \$2.3 Million in FHWA Strategic Highway Research Program (SHRP 2) implementation assistance and other federal grants. Currently, seven active projects are in various stages of development and implementation phases that advance:

- Transportation Systems Management and Operations (TSM&O)
- State-of-the-art Maryland Integrated Travel Analysis Modeling Systems
- Performance based Planning and Programming
- Mobility Performance Management including Integrated Corridor Management (ICM) and Active Traffic Management
- Freight Demand Modeling/ Supply Chain Analysis/ Economic Development at the agency

The multi-resolution modeling system includes capabilities such as activity-based models, agent based models and dynamic traffic assignment and enables very detailed analysis of systems. These advanced modeling systems should serve as a key foundation to understand the implications of a multitude of AV Proving Ground concepts and implementation ideas, both from a supply and demand side. For example, simulation models can support analysis at localized test beds, controlled test corridor facilities and generate necessary performance metrics for evaluation and refinement of technology applications.

Demonstrated Investments

The strength of the designation of this corridor is that the facilities are already in place, are operational, and many are outfitted or primed with necessary equipment and data sharing systems. No long-term construction or development of new facilities needs to occur to be operational. MDOT is already committed to supporting investments in next generation V2I/CV infrastructure and telecommunications infrastructure to facilitate connectivity along the corridor. And private sector, academic, defense and other test entities can work through the MDOT permitting process under the auspices of the AV Proving Ground designation to deploy their own equipment in the public space in return for assurances of safety, data sharing (safety and mobility) and collaborative efforts that contribute to advancing AV.

Readiness

MDOT is currently organizing its policies and procedures for testing on public roadways and fully expects these to be in place before January 1, 2018 and for RITIS or other data sharing mechanisms to support operations at that time. The corridor is already operational and testing is currently being conducted at private, academic, defense and state facilities. MDTA has successfully tested CV applications along the Corridor and would apply similar approaches that ensured safety and data sharing to support decision-making and implementation. MDOT is offering specific state-owned locations within the I-95 corridor as well as Port and BWI airport facilities. MDOT will include local agencies and law enforcement in the testing permitting process and ensure compliance with safety standards and with federal and state laws during AV testing. Local entities are already participating in the Working Group and may participate in the AVCV Technical Working Group when reviewing testing requests.

Adherence to Laws, Regulations, and Federal Policy

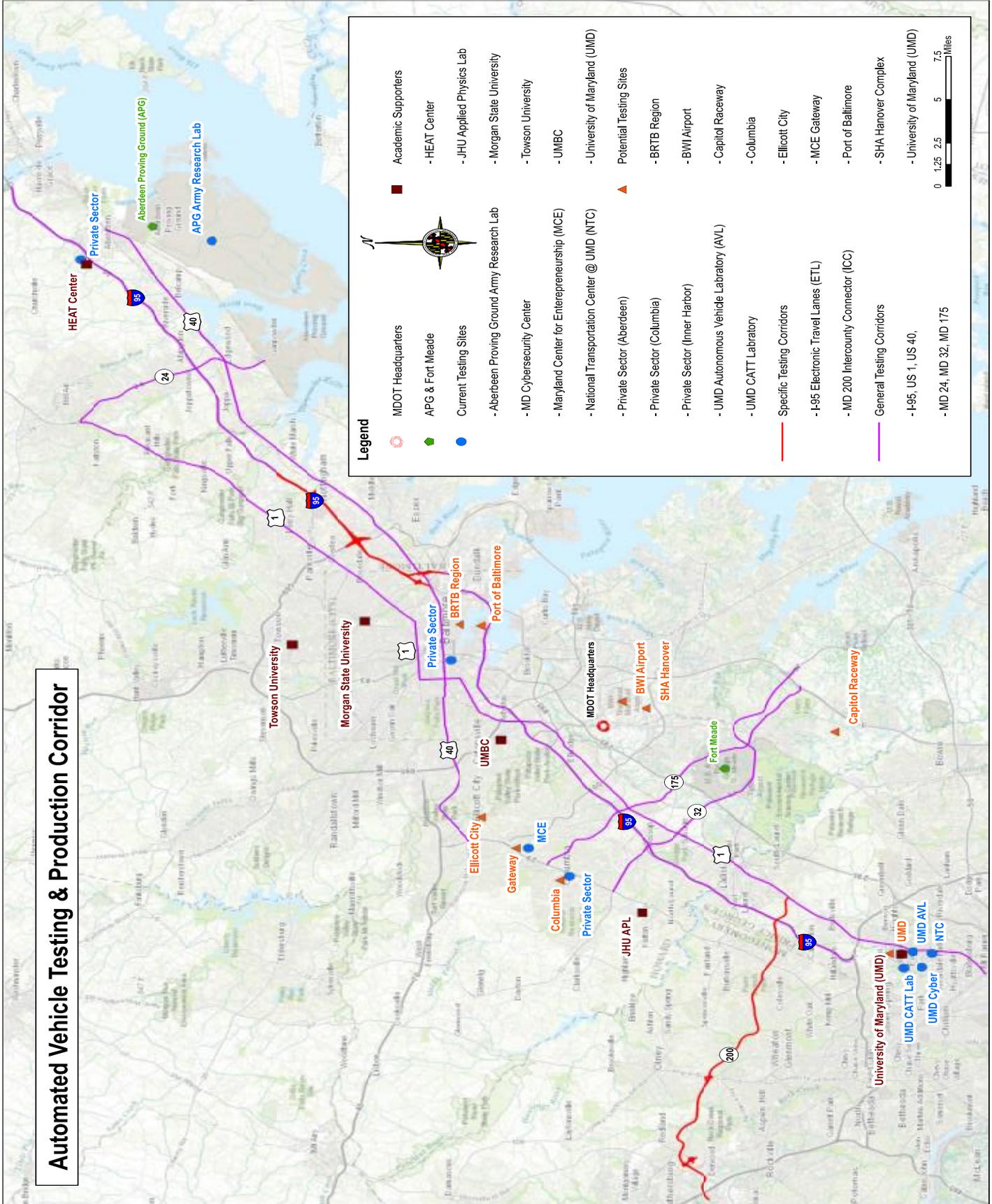
MDOT has been engaged for several years in national discussions via the American Association of Motor Vehicle Administrators (AAMVA) to develop analysis of current laws and their applications to HAVs and to develop best practices that have been, for the most part, included in NHTSA's Guidelines for HAVs. Through MDOT's AVCV Working Group and AVCV Technical Working Group, we continue to work to identify and address program areas such as operator training, testing and licensing, vehicle registration and titling, data privacy and security, consumer safety and other areas that are priority aspects in consideration of the development of HAV technology. MDOT will ensure that testing adheres to state and local laws, as well as federal guidelines, laws and regulations.

The AVCV Working Group includes representation from Maryland's State Legislature, including the Chair of the Motor Vehicle & Transportation Subcommittee, Environment & Transportation Committee in the House of Delegates. This will ensure connectivity between future policy needs and legislative experts - and facilitate the development of any needed changes to Maryland law if necessary.

MDOT, the I-95 Corridor Coalition and the University of Maryland recently held a Summit on Autonomous Vehicle Regulation and Policy with a focus on state perspectives in May 2016. Maryland will continue playing a leadership role in the national dialogues on state-level regulation and policy instruments that can ensure smooth integration of AV technologies into the existing transportation infrastructure system.

APPENDIX

Appendix A – Corridor Facilities for Testing



Appendix B – AV Research and Production Corridor Resources

Aberdeen Proving Ground Area

- Army Alliance
- Battelle
- Regional Additive Manufacturing Partnership of Maryland
- Chesapeake Science and Security Corridor consortium of local governments (Cecil County, Baltimore County, Harford County, Baltimore City)
- Harford County Government

Fort Meade Area

- Fort Meade Alliance
- Cybersecurity Consortium
- Maryland Center for Entrepreneurship

Naval AV Development and Surface AV Tech Transfer

- Various private sector AV development ongoing at Baltimore's Inner Harbor

Private Sector Companies leading AV development in the Corridor (per their websites)

- Maritime Applied Physics Corporation
- LSA Autonomy
- Robotic Research, LLC
- General Dynamics Robotic Systems
- Local Motors
- Steer, Inc.

Academic Resources

- Johns Hopkins Applied Physics Lab (APL) (Aberdeen)
- Morgan State University National Transportation Center (public attitudes to technology)
- University of Maryland Baltimore County Cyber Security Academy
- University of Maryland (AV development, Center for Advanced Transportation Technology Laboratory research and data sharing, cyber security, partnership with Ford Motor Company, behavior responses to AV technology at the UMD National Transportation Center)

Government Resources

- Maryland Department of Commerce
- Howard County and Harford County Economic Development Agencies
- Baltimore Regional Transportation Board, Baltimore Metropolitan Council (Baltimore City, Baltimore County, Harford County, Anne Arundel County, Howard County, Carroll County, and City of Annapolis)
- Metropolitan Washington Council of Governments (Prince Georges County, Montgomery County)

Additional Resources

- Port of Baltimore
- Baltimore Washington International Thurgood Marshall Airport
- Crofton Capital Raceway

- Federal Law Enforcement Training Center
- Maryland Law Enforcement Training Center (Sykesville)
- Development Sites along the Corridor available for testing through county economic development agencies
- Columbia Town Center, Ellicott City

Appendix C - Additional Descriptions of Existing Automated Vehicle Testing Currently in the Corridor

Army Research Lab, Vehicle Technology Directorate

The U.S. Army Research Laboratory's Vehicle Technology Directorate (VTD) is the principal U.S. Army unit responsible for the pursuit of mobility-related science and technologies leading to advanced capabilities and improved reliability for Army air and ground vehicles. VTD leads the ARL Major Laboratory Program in mobility and the Research, Development and Engineering Command (RDECOM) Technology Focus Team in mobility and logistics. The technology focus areas within the ARL and RDECOM programs have been defined as platform, propulsion, intelligent systems and logistics.

The VTD conducts basic and applied research in collaboration with other ARL functions, RDECOM, Navy, Air Force, academia and industry leaders. Leveraging VTD also research efforts associated with Collaborative Technology Alliances (CTAs) and Multidisciplinary University Research Initiatives (MURIs). For example, VTD is actively involved with two CTAs (Robotics and Micro Autonomous System Technologies), several cooperative agreements, and a unique partnership with the National Aeronautics and Space Administration (NASA) at the Langley Research Center in Hampton, VA and the Glenn Research Center in Cleveland, OH.

The VTD operates in three facilities. The main site at Aberdeen Proving Ground, in Aberdeen, Maryland hosts the directorate offices and focuses on autonomous systems and mechanics research with cross-cutting interdisciplinary analysis and technology development supported by the recently-formed Vehicle Applied Research Division. The NASA-Langley site hosts the Mechanics Division aeromechanics field element, and the NASA-Glenn site is home to the Propulsion Division.

VTD has significant efforts in the development of autonomous system technologies at Aberdeen Proving Ground involving its Autonomous Systems Division. Specifically, the Intelligent Systems focus area is associated with the development of autonomous vehicle systems, including autonomous maneuver, manipulation, and collaborative operations. VTD will work to establish an ARL enterprise approach for developing an autonomous systems research plan (including inter-directorate contributions to key topical research areas such as perception, intelligence, and human-robot interaction), and will establish a new Robotics Collaborative Technology Alliance (CTA) as the previous CTA reaches its conclusion.

Autonomous Systems Division

The Autonomous Systems Division (ASD) supports basic and applied research conducted within ARL, externally with other government and industrial organizations, and with the Robotics CTA. Within the Robotics CTA, ARL and its partners have historically conducted research in the areas of perception, intelligent control and behaviors, and human-machine interaction to enable autonomous ground platforms that will provide future land combat force with significant new operational capabilities. A new element will be developed moving forward in that includes research in manipulation. The ASD has internal research programs focused on autonomous mechanics, intelligent control, and manipulation to develop increased levels of autonomy for a broad range of mobile platforms, including unmanned aerial vehicles (UAV), unmanned ground vehicles (UGV), and Microsystems.

- 57 accredited 2 & 4-year colleges & universities
- 16 community colleges offering continuing education and workforce training

Appendix E – MDOT SHA's CHART Program

As Maryland's real-world application of Transportation Systems Management and Operations (TSM&O), CHART is focused on the following:

- Monitoring and responding to incidents;
- Disseminating traveler information;
- Monitoring traffic and roadway conditions; and
- Using its systems, communication network, and advanced technology to support related SHA functions.

The application of ITS technology is especially evident on our State highways through the CHART Program:

- CHART has access to more than 800 total video feeds available to our Statewide Operations Center (SOC) operators (from all jurisdictions).
- More than 300 can be manipulated by CHART operations staff. The remaining 500+ are view-only and owned by other jurisdictions.
- Additionally, CHART recently added advanced cameras on all 74 CHART Emergency Response Technician (ERT) vehicles that can be controlled remotely from CHART's SOC and three satellite Traffic Operations Centers (TOCs).
- The new Governor, Secretary of Transportation, and State Highway Administrator are doubling-down on operations and advanced technologies. They have also recently approved major technology enhancements to the CHART operations center.



The MDOT/SHA/CHART Statewide Operation Center



The new collaborative, multi-agency CHART statewide ops center will be well positioned for AV technology deployments

In addition to cameras, the CHART infrastructure of devices has grown to include:

- 89 SHA-owned dynamic message signs (DMS');
- 34 SHA-owned highway advisory radios (HARs);
- 57 SHA-owned weather stations; and
- 315 SHA-owned traffic detection devices.

CHART plans to install another 80 new cameras over the next two years, which will considerably expand the visual coverage of Maryland freeways.

CHART also receives speed and driving time data from its partnership with the I-95 Corridor Coalition and the University of Maryland through a contract with a private firm. This data coverage is statewide.

Maryland also has a robust 511 traveler's information service that provides timely, reliable and relevant traffic, weather, and intermodal information to its users. Travel time information is also displayed on DMS' in several locations throughout the state (Baltimore and Washington metropolitan areas and on the way to the Eastern Shore).



The Maryland 511 Traveler Information public website Program



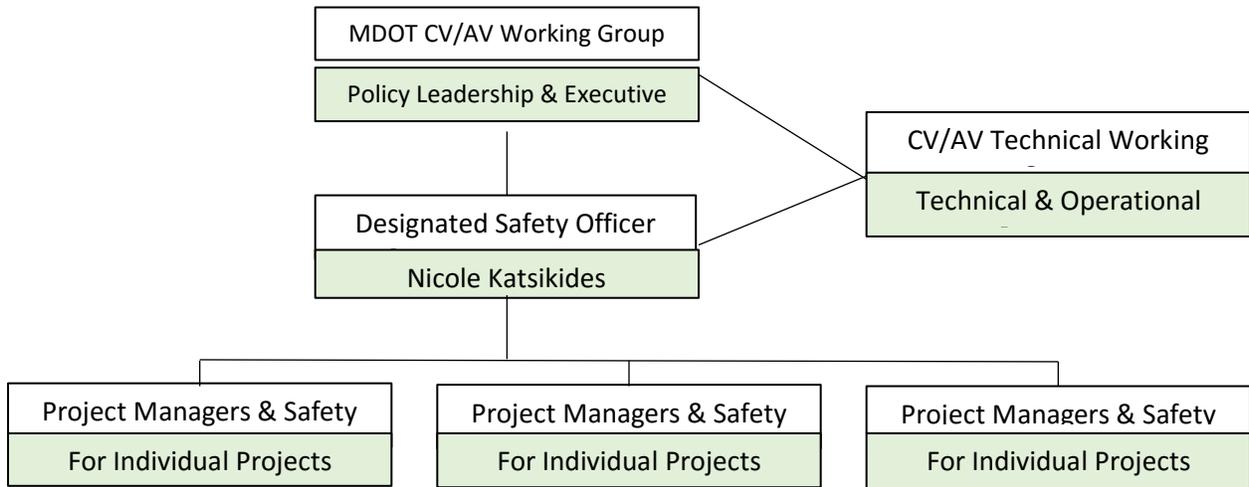
Maryland's Travel-Time-on-DMS

CHART's Advanced Traffic Management System (ATMS):

- Uses probe data provided by a service (Inrix) as well as state-owned side fired microwave point detection.
- Is used by more than 36 agencies, including law enforcement, in more than 91 operations centers.
- Directly polls Automatic Vehicle Location (AVL) of all CHART response vehicles (currently 74)
- Receives a feed of the rest of the SHA vehicles (approximately 2,000) that it uses to populate responding vehicles to traffic events.
- Since 2012 has more built-in systems intelligence, thus providing decision support to operators by recommending incident response strategies and nearby infrastructure (e.g., DMS', HARs, and cameras) to increase the efficiency of responses by reducing the time needed to prepare a complete response plan.
- Recently upgraded to allow the system to be configured to automatically activate devices based on current readings from one or more weather sensors (e.g., ability to display a message on a DMS, broadcast a message on a HAR).
- In 2014, introduced the Lane Closure Permit (LCP) application, which allows for the implementation of more comprehensive permitting requirements for almost all lane closures statewide.

APPENDIX F – MDOT's AV Research and Production Corridor Governance

Management of the AV Research and Production Corridor will be supported by a Designated Safety Officer responsible safety planning, data sharing and coordination of stakeholders in testing. The Safety Officer is supported by the MDOT AVCV Working Group of public and private sector leaders, as well as the AVCV Technical Working Group of MDOT engineers, safety officers, analysts, technicians and planners.



Designated Safety Officer

Nicole Katsikides has been nominated by MDOT to serve as the Designated Safety Officer. In this role, she will bring focus and energy to coordinating, collaborating, and communicating across the spectrum of stakeholders that could potentially be involved in this effort and ensure a singular voice is in charge of a diverse set of facilities and test bed locations across the state. She has had success in leading coalitions and data sharing research programs that will support MDOT's AV designation. Ms. Katsikides currently serves as the Deputy Director of MDOT SHA's Office of Planning and Preliminary Engineering. In this role, she is Director of the Data Services Engineering Division. Ms. Katsikides has held federal and state positions in operations, freight (safety, planning, policy and operations), planning and policy, most recently being in the Office of Operations at Federal Highway Administration before assuming her MDOT role.

Ms. Katsikides will draw support from a large pool of resources being made available for this effort by the Maryland DOT. As the Program Manager for this effort she will report to the MDOT AVCV Working Group, where policy oversight and resource allocation will be governed. And she will have a robust set of technical resources available from the AVCV Technical Working Group, which includes a diversity of expertise that represent engineering, safety, ITS, data management, and other disciplines. Most of these experts are active in USDOT projects and forums, especially with the Federal Highway Administration Offices of Operations and Safety, as well as AASHTO, TRB, ITE, APTA, and ITS America - ensuring we bring the state-of-the-practice to our everyday thinking and program management.

With the support of these expert policy and technical resources, Ms. Katsikides will develop the overall Proving Ground Safety Management Plan. This plan will lay out the procedures and guidelines for testing in Maryland, recognizing that flexibility and innovation must be balanced with a focus on the safety of the practitioners involved as well as any non-participants given the fact that public roadways and facilities may be employed in testing. Strict adherence to communication and coordination policies will be required, but measured against the backdrop of fostering the advancement of concepts and technologies.

Our proposed corridor includes a number of different types of roadways and facilities, which we are confident will make our proving ground designation very attractive to a number of entities looking to test CV & AV technology. However, it also means multiple test and evaluation projects could be underway at any given time, at different locations, making it necessary for Ms. Katsikides to delegate individual Project Managers with safety officer responsibilities to the different efforts. As the overall Safety Officer and Program Manager she will coordinate with the deputies on a frequent basis ensuring that their individual projects comply with the overall safety management plan and goals/objectives for the overall MDOT proving ground program.

For example, the FHWA is currently testing cooperative adaptive cruise control and other CV applications at the APG. The APG has in turn designated a principal point of contact and safety manager for these efforts. As we fold APG into the broader corridor and proving ground concept, Ms. Katsikides would call upon the experience and resources of individuals like this to support specific test and evaluation sites and activities.

Ms. Katsikides will participate in the Community of Practice regular meetings, in addition to related industry activities where she can share the lessons learned in governing the evaluation and testing of CV & AV technology. A self-described "data geek" Ms. Katsikides will also bring a wealth of experience in making sure performance metrics and non-proprietary data is made readily available to research and academic entities with an interest in advancing the practice.

Below is the AVCV Working Group Roster, and for more information, visit:

<http://www.mva.maryland.gov/safety/Maryland-AC-CV.htm>

Name	Organization
Alkhatib, Suhair	Maryland Transit Administration
Averella, Ragina	AAA Mid Atlantic
Beatty, Carol	Secretary of Maryland Department of Disabilities
Beidle, Pam	Maryland General Assembly
Beuse, Nat	NHTSA /US DOT
Bohle, Matt	RWL
Brady, Michael	Maryland State Police
Brown, Chuck	External Affairs Manager, Maryland Motor Vehicle Administration
Cameron, Ed	Maryland State Police
Campion, Louis	President, Maryland Motor Truck Association
Cavey, Nick	Maryland Insurance Administration
Chaffee, Milton	Maryland Transportation Authority Administrator

Comfort, Paul	Maryland Transit Administration Administrator
Conrad, Peter G.	AICP, Maryland Department of Planning
Dacey, Phil	Maryland Motor Vehicle Administration
DeLuca, Mark	Howard County Public Works, Director
Derr, Ray	Transportation Research Board
Fisher, Josh	Global Auto Makers
Flanagan, Bob	Maryland General Assembly
Frank, William	Maryland Department of Disabilities
Garcia, David	Secretary, Department of Information Technology
Gelormino, Michael	Maryland State Police
Getty, Laura	MTA, Office of Planning
Gianni, Tom	Maryland Highway Safety Office
Gibson, Renee	Auto Alliance
Halligan, Don	Baltimore Metropolitan Council
Hanratty, Rosanne	Maryland Department of Aging
Harmel, Larry	Executive Director, Maryland Chiefs of Police Association
Herder, Timothy S.	Johns Hopkins University/Applied Physics Laboratory (JHU/APL)
Jackson, Betsy	DoIT
Jacobs, Tom	UMD-CATT
Johnson, Curtis	The Secretary's Office
Johnson, Gregory	Maryland State Highway Administration Administrator
Jones, Aaron	Maryland State Highway Administration
Katsikides, Nicole J.	Maryland State Highway Administration, Deputy Director
Keller, Pat	Maryland Transit Administration
Kelly, Helen	MDOT-MVA Driver Services
Knapp, Leslie	Maryland Association of Counties
Knighton, James	Maryland Transit Administration
Kodeck, Ned	MVA Special Counsel
Kramer, Rona	Secretary, Maryland Department of Aging
Kregelka, Joyce	MHSA
Kress, William	Greenfield & Kress, PA
Krimm, Carol	Maryland General Assembly
Kuciemba, Steve	WSP Parsons Brinckerhoff
Lesh, Matthew	Local Motors
Lewis, Jr., Earl	MDOT, Deputy Secretary
Mansfield, Andrea	Maryland Association of Counties Legislative Director
McDonald, Ed	MDOT Chief of Staff
McGraw, Carrie	Maryland Department of Disabilities
Mehu, Natasha	MACO
Moe, Peter	Maryland Motor Vehicle Administration, Driver Safety Manager

Morrison, Dorothy	MDOT-The Secretary's Office
Mukai, Roxane	Maryland Transportation Authority
Murphy, Heather	MDOT, Director of Planning and Capital Programming
Murray, Donovan	General Manager, Port, Intermodal and Trade Development
Nizer, Christine - Chair	MDOT-MVA Administrator
O'Neill, John	Maryland Transportation Authority
Pallozzi, William	Secretary, Maryland State Police
Parr, Carl	MTA Mobility
Pavlovich, Natasha	PORT SLS&MKT-DIRECTOR'S OFFICE
Porter, Damon	Global Auto Makers
Ports, Jim	Maryland Department of Transportation Deputy Secretary (Operations)
Quinn, Kevin	Maryland Transit Administration
Rau, Teja	Department of Aging
Redmer, Jr., Al	Maryland Insurance Administration Commissioner
Reigrut, Kevin	MDOT-TSO
Robinson, Melissa	MVA Regulations
Rodriguez, Gregory	Best Best and Krieger Attorneys at Law (BB&K)
Rogers, Deborah	MVA Director of Vehicle Programs
Ross, Andrew	Department of Aging
Russell, Jimmy	Maryland State Police
Russell, Kelly	City of Frederick
Ryan, Paul	Senior Dir. Gov. Relations Association of Global Automakers
Schieke, Nanette	Motor Vehicle Administration
Scullion, Paul	Global Auto Makers
Sharma, Nimisha	MDOT - TSO
Sheffield, Tracey	MDOT - MVA
Simmons, Doug	JMT
Simpson, Burney	Driverless Transportation, Editor
Slater, Greg	State Highway Administration
Sonalker, Anuja	CEO, STEER Tech, LLC
Stanicic, Blaise	Capitol Strategies
Staten, Latoya	Steer Tech
Stitcher, Kevin	Maryland State Police
TeBeest, Randy	Office of Cybersecurity and Aerospace
Tracy, Patrick	Department of Legislative Services
Turner, Colleen	MDOT-TSO
Winick, Robert	Motion Maps, LLC
Woessmen, David	Local Motors
Woo, Richard	State Highway Administration
Xu, Bihui	Maryland Department of Planning

Sagal, Joseph	MDOT-SHA
Zektek, Barbara	MACO
Jeffers, Breck	Federal Highway Administration, Maryland Division
Schneider, Anna-Maria	Industry and Government Relations

Below is the AVCV Technical Working Group Roster and for more information, visit:

- Nicole Katsikides, Organizer, Deputy Director of Planning and Engineering, MDOT SHA
- Tom Jacobs, Director, UMD CATT Lab
- Carole Delion, Team Leader, Travel Forecasting and Analysis, MDOT SHA
- Jim Dwyer, Director, Planning and Capital Programming, MPA
- Steve Kuciemba, Vice President, Parsons Brinkerhoff
- Subrat Mahapatra, Manager, Innovative Planning and Performance Mgt, TSM&O Manager, MDOT SHA
- Nanette Schieke, MDOT MVA
- Aaron Jones, Policy and Research, MDOT SHA
- Joseph Sagal, Director, MDOT SHA CHART
- Ralign Wells, Director of Ground Operations, MDOT MAA
- Gregory Slater, Deputy Administrator, MDOT SHA
- Richard Woo, Ph.D., Director, Policy
- Egua Igbinosun, MDOT SHA CHART
- Glenn McLaughlin, MDOT SHA CHART
- Cedric Ward, Director, Office of Traffic and Safety, MDOT SHA
- Brian Miller, Director of Operations, Port of Baltimore
- Roxane Mukai, Operations Manager, MDOT MDTA
- Lt. Jonathan Green, Maryland Transportation Authority Police
- John O'Neill, Director, Operations, MDOT MDTA
- Peter Moe, Director, Safety, MDOT MVA
- Dominic Scurti, Manager, Operations for Port of Baltimore

Appendix G – Maryland Experience with ITS, CV and AV

Transit

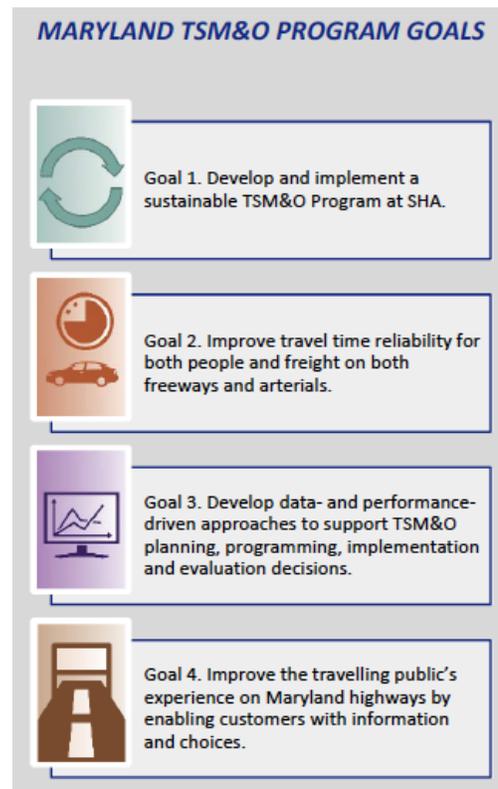
The Maryland Transit Administration sponsored the development of a connected-vehicle application for Light Rail Trains operating on a traffic signal controlled corridor in Baltimore, MD. The project developed the pseudo code and tested the CV application in a real-world test bed in a simulated environment, demonstrating positive benefits for transit operations in terms of a 30-40% reduction in the number of stops at traffic signals, and a 30-50% reduction traffic signal delays.

State Highway Administration

The Maryland State Highway Administration (SHA) has progressed through the Transportation Systems Management & Operations (TSM&O) planning process and has a robust multi-disciplinary group in place to handle a number of new and innovative ideas. MDOT SHA released a Transportation Systems Management and Operations (TSM&O) Strategic Implementation Plan that offers an integrated approach to programmatic optimization of planning, operations, and maintenance in implementing new and existing multi-modal systems, services, and projects to preserve capacity and improve the security, safety, and reliability of our transportation system. This Strategic Implementation Plan summarizes a business case for TSM&O; establishes the mission, vision, goals, objectives and performance measures for TSM&O within MDOT SHA; and identifies the strategies and projects required to implement TSM&O in the areas of leadership/organization, business processes, tools and data.

Through various objectives and strategies, the TSM&O Plan calls for leveraging improved technology applications, develop partnership opportunities to enhance transportation system reliability, including specific strategies geared towards CVAV).

As part of a FHWA Integrated Corridor Management (ICM) Pilot, MDOT SHA in coordination with the Baltimore Metropolitan Council and other stakeholders is developing a Concept of Operations Plan on the I-95 corridor between the Capital and Baltimore Beltways. The State is also pursuing a \$100 Million Innovative Congestion Management Project on it's I-270 corridor that offers some unique partnering opportunities with the private sector to advance system operations. The agency views these projects and initiatives playing a symbiotic role to advance AV preparedness on our State, engage private sector, research centers and customers in solution development.



As the agency advances various key strategies of the TSM&O Plan such as developing Integrated Freeway/Arterial master plan, Advanced Traffic Management System capabilities, there are strong collaboration opportunities with this proposed AV Proving Ground application.

Maryland Transportation Authority

The MDTA, as a transportation lead, has a significant advantage in the development and sharing of transportation network technology relevant to the AV field. MDTA's tolled roadway network and enforcement responsibilities require MDTA staff to manage and operate systems that utilize the technologies being redeployed in the AV field. For example dedicated short range communications (DSRC); optical camera recognition (OCR); and laser, radar, lidar and loop (magnetic) detection and response systems are used within MDTA's tolling, weather monitoring, control, security, and enforcement programs. MDTA staff members also operate and maintain cameras, dynamic-message signs, highway advisory radios, inter-active voice response systems and websites to share information with the agency's customers and stakeholders.

In keeping with the USDOTs desire for designated AV Proving Ground sites to openly share best practices, MDTA staff and consultants are members of, participate on panels with, present information at conferences and share technical information through numerous organizations including the Transportation Research Board (TRB); National Cooperative Highway Research Program (NCHRP); American Association of State Highway Officials (AASHTO); International Bridge, Tunnel and Turnpike Association (IBTTA), "E-ZPass" Inter-Agency Group (IAG); National Committee on Uniform Traffic Control Devices (NCUTCD); American Society of Civil Engineers (ASCE) and Institute of Transportation Engineers (ITE) to name a few. MDTA's partnership with the University of Maryland (UM) Regional Integrate Transportation System Information System (RITIS) and the I-95 Coalition has familiarized staff with the necessary steps to process collected data into a shared format that can be disseminated to and utilized by the broader transportation community.

MDTA's I-95 Express Toll Lanes (ETL) and Intercounty Connector (ICC)/MD 200 are controlled access expressways that were built to current design standards and equipped with an extensive suite of sensors and communication devices (cameras, automated traffic recorders, dynamic message signs, DSRC readers and more). Both the ETL and ICC are already equipped with the physical infrastructure (overhead gantries) and continuous fiber optic network capable of supporting additional roadside sensors for testing new automated vehicle infrastructure devices and vehicles. The ETL and ICC are located near multi-modal public transportation hubs (White Marsh Park and Ride, Baltimore Travel Plaza and Metro Station), high volume freight generators/receivers (Port of Baltimore, Amazon Distribution Center) and high volume community gathering points (malls, schools, libraries) that could be used to stage automated vehicles, conduct public demonstrations and engage the traveling public in intelligent transportation network development to support the future of ground transportation in connected and automated vehicles.

Appendix H - RITIS Features

There are three primary RITIS components: (1) real-time data feeds and data sharing, (2) real-time situational awareness and decision support tools, and (3) archived data visualization and analysis tools.

Real-Time Data Feeds/APIs

RITIS data feeds are services that provide direct access to real-time incident, event, detector, probe, weather, transit, connected vehicles (heavy braking, traction control, wiper use, etc.), transit and law enforcement AVL, SPaT, crowd-sourced incidents, and other data sources including ITS device status. The RITIS data feeds are designed to facilitate integration of RITIS data back into legacy and third party systems and for third-party application developers who need access to real-time information for dynamic mobility applications. The data feeds provide for implementation flexibility both in data format and retrieval method. The RITIS platform and associated APIs allow each agency to determine which data elements it wishes to provide in the data feed or maintain secure and secluded from other agencies or the public.

Real-Time Situational Awareness and Decision Support Tools

The RITIS website allows users with appropriate credentials to view all of the real-time RITIS data in a browser. The website provides users with a dynamic set of visualizations and tools that afford efficient situational awareness. Authorized users can interact with live events, incidents, weather, sensors, radio scanners, and other data sources and devices in maps, lists, and other graphics. Users can apply a rich set of filters, access contact information, and even set up alerts.

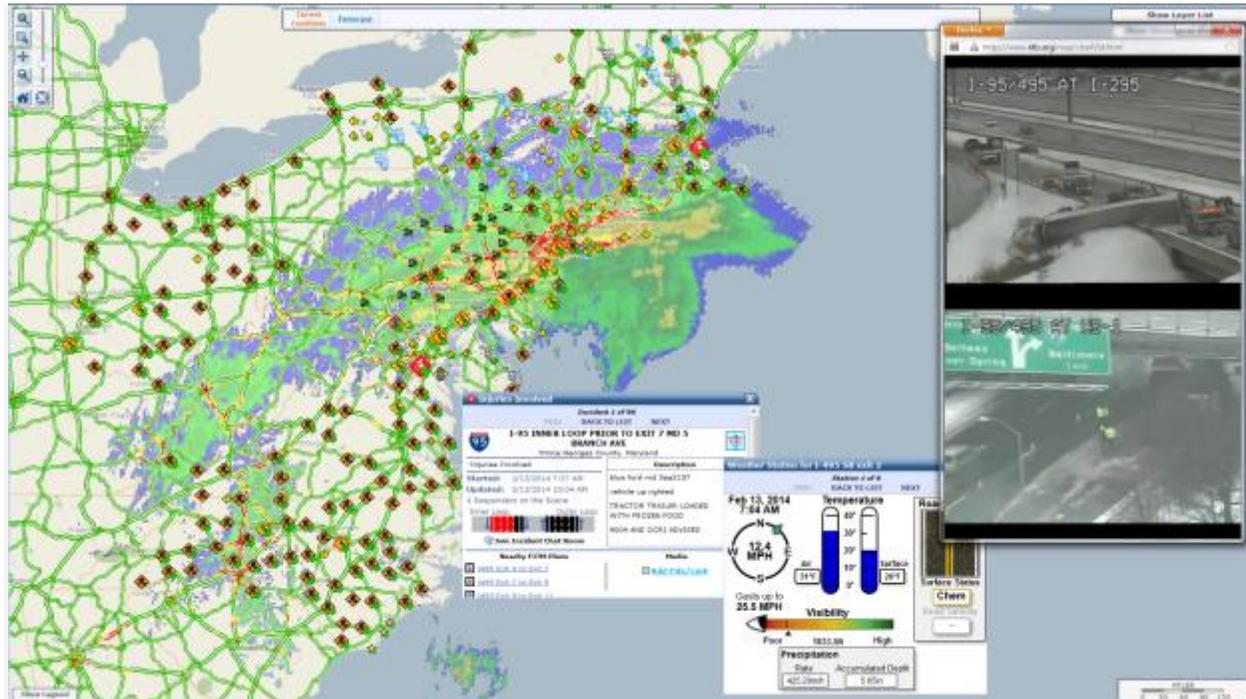


Figure 1: Sample screenshot of the RITIS map showing live video, weather, traffic, and incident information.

Archived Data Analysis Tools

All data within RITIS is archived indefinitely—meaning that no data is ever deemed “too old” to be removed from user access. A great number of interactive tools have been developed to allow users to query, analyze, develop reports, divine insights, and derive performance measures from the RITIS archive. Many of these tools are highly interactive and dynamic. They have been developed with the user in mind and afford a high degree of freedom to explore the data with minimal training needed. Data within the archive can also be downloaded and/or exported so that users can perform their own, independent analysis. These tools can allow users to identify collision hot-spots, analyze queue lengths and traffic congestion/bottlenecks at specific areas, perform after action reviews, compute user delay cost, environmental impact, and evaluate the effectiveness of transportation operations strategies. A few screenshots of these applications are included below.

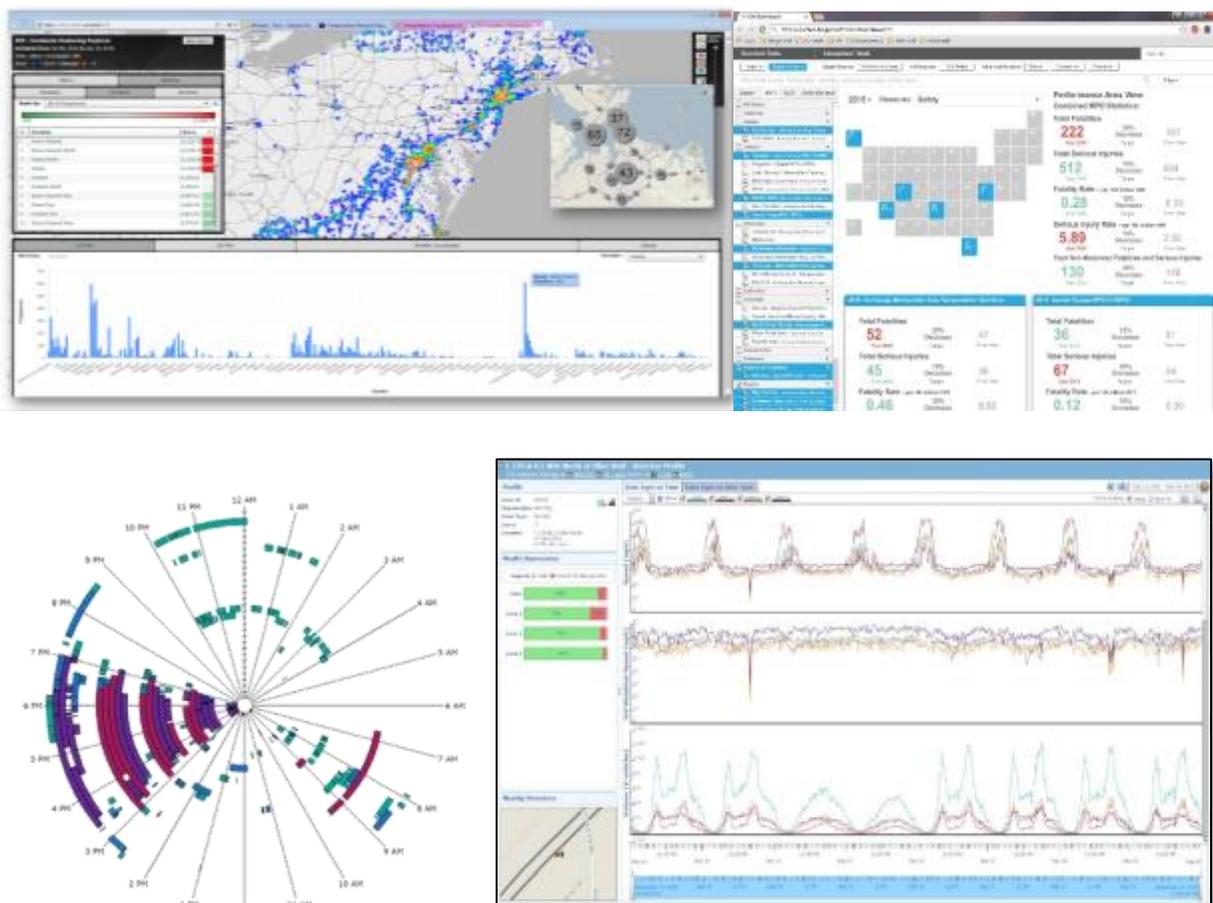


Figure 2: Select examples of interactive analytics from the RITIS platform.

RITIS provides an exceptional platform for data sharing and performance measuring analytical tools that are used nationally for mobility, safety and traffic data. The University of Maryland is committed to integrating AV testing data collection, analysis and data sharing capabilities into RITIS.

Appendix I – Private Sector Success Stories in AV Along the Corridor

Maryland's Department of Commerce and local economic development agencies have played a key role in automated technology in Maryland. Read more about Commerce's efforts here: <http://open.business.maryland.gov/manufacturing/>

Some of the companies innovating in AV technology along the Corridor are listed below. Information was provided directly or is available on their public websites.



Local Motors (provided directly)

<https://localmotors.com/>

Local Motors ("LM") is a technology company that has decentralized and simplified the development, production, and commercialization of vehicles by combining open-source development with flexible, consumer-facing digital microfactories which engage a significant amount of 3D printing. We believe that all vehicle manufacturers share an obligation to benefit future generations.

For the past decade, that spirit has driven LM and has resulted in the world's first 3D-printed vehicle, the Strati, and the world's first cognitive self-driving shuttle, Olli. Olli, specifically, represents our ability to rapidly integrate the latest technology into our vehicles. In this case, over 30 sensors to enable L4/L5 automation along with the advanced cognitive computing capabilities of IBM Watson's allow direct interaction between riders and Olli.

Local Motors is pursuing:

- **Development and testing of low-speed vehicles in environments that can pave the way for widespread deployment of HAVs.** Olli is quite adaptable in its operation and use, so we are prepared to work with MDOT, UMD and other partners to obtain approval to test and deploy Olli in various low-speed environments to validate various use case scenarios at ports, airports or other simulated environments in Maryland. Olli's ability to move goods and parcels as well as shuttling people while operating in potential multi-modal scenarios provides the opportunity to gather as wide a data set as possible. The ability to gather and use this data is critical to understanding a safe and meaningful pathway to a future where HAVs dominate roadways.
- **Rapid improvement of vehicles before deployment in development and production facilities in the State of Maryland.** Local Motors' approach to vehicle commercialization and deployment is unique among vehicle manufacturers. We work with a community of creators, partners and consumers to commercialize vehicles rapidly and continuously to make improvements in real time. Often, we develop a minimal viable product that we test in the market to better measure and understand demand for locally relevant vehicles. Specifically, we have established a sales and demonstration facility in National Harbor, MD which includes a private user experience and demonstration area for vehicle development, testing, and demonstration that is open to partners and community members. Additionally, Local Motors has been working closely with various Maryland stakeholders to build a full-

scale digital Microfactory. This facility will have the ability to develop, build and sell locally produced vehicles, including Olli and neighborhood electric vehicles.

HAVs and SDVs will be deployed in alternative use cases which will often be different than traditional vehicles. This issue will become more acute as these new vehicles increasingly play a critical role both in downtown city (core) areas, as well as becoming an important "connector" in the more suburban areas where cities continue to struggle to meet rising mass transit demands.

Local Motors is unique among vehicle makers in our open, co-creative approach to rapid design, development, manufacturing and upgrade of vehicles. In this open spirit, we look forward to collaborating with MDOT and other industry stakeholders to further the adoption of HAVs and SVDs by the general public to create safer, smarter and more sustainable public roads for all. We will work to share relevant vehicle test and safety data amongst relevant stakeholder groups. Local Motors believes that the future of transportation will be redefined by automated and autonomous vehicles, and we stand ready to build them.

Tower Sec, Columbia, MD - TowerSec was a pioneer provider of Cyber Security solutions to the automotive industry developed in Howard County along the I-95 Corridor. In January 2016, HARMAN International Industries acquired TowerSec to form HARMAN's Automotive Cyber Security Business Unit, part of the company's Connected Car division.

Steer, Columbia, MD, STEER is focused on building the next generation technology driving future vehicles.

Robotic Research, LLC, <https://www.roboticresearch.com/>, Robotic Research, LLC is a small engineering firm committed to finding innovative, cost-effective solutions in the areas of robotics, intelligent control, sensor processing and specialized computer programming. Robotic Research engineers design, develop, and test state-of-the-art autonomous mobility software.

<https://mdbiznews.commerce.maryland.gov/2011/09/a-i-the-future-of-defense/>

Maritime Applied Physics Corporation (MAPC), Baltimore, MD, http://www.mapcorp.com/our-work/unmannedautonomous-vehicles/UNMANNED/AUTONOMOUS_VEHICLES MAPC has been at the forefront of the burgeoning field of unmanned vehicles for many years, ever since they helped prove the concept for the US Navy with the unmanned hydrofoil. Since then, they have done the same with surface vessels, personal watercraft, ground vehicles, and sailboats.

General Dynamics, Annapolis Junction, MD, <http://www.generaldynamics.com/news/press-releases/2010/05/general-dynamics-robotic-systems-completes-successful-autonomous> Development and testing of autonomous technology.

Battelle, Aberdeen, MD, <http://www.battelle.org/our-work/homeland-security-public-safety/transportation-services/connected-vehicle-solutions> For more than 10 years, Battelle has been trusted as the lead in development and deployment of numerous large-scale research, network and security work and application development projects with the U.S. Department of Transportation, NHSTA and local authorities.

Appendix J – Letters of Support

The following pages provide letters of support from the stakeholders listed below:

1. United States Army Automotive Directorate, Aberdeen Proving Ground
2. Army Alliance, Aberdeen
3. Battelle
4. University of Maryland Center for Advanced Transportation Technology Lab (CATT Lab)
5. I-95 Corridor Coalition
6. Baltimore Regional Transportation Board (BRTB)
7. Delegate Robert Flanagan, Maryland House of Delegates, District 9B, Environment and Transportation Committee, Former MDOT Secretary
8. Harford County Executive Barry Glassman
9. Harford County Economic Development
10. Howard County Chamber of Commerce
11. Maryland Motor Truck Association
12. Parsons Brinkerhoff
13. Regional Additive Manufacturing Partnership of Maryland
14. National Capital Region Transportation Planning Board (TPB)
15. Local Motors
16. Steer
17. Senator Wayne Norman, District 35, Harford County Senate Delegation Chair
18. Maryland Department of Commerce Secretary Gill
19. Delegate Pamela Beidle, District 32, Anne Arundel Delegation Chairwoman, Environment and Transportation Committee
20. Senator Jim Brochin, District 42, Baltimore County, Baltimore County Senate Delegation Chair



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY ABERDEEN TEST CENTER
400 COLLERAN ROAD
ABERDEEN PROVING GROUND, MARYLAND 21005-5059

Automotive Directorate

19 December 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

We would like to take this opportunity to express our interest in the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with U.S. Army Aberdeen Proving Ground (APG) and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

The U.S. Army Aberdeen Test Center (ATC) is located at APG in Harford County, Maryland and is a Department of Defense (DoD) Major Range and Test Facility Base (MRTFB). As such, we are resourced with personnel and facilities to support the DoD mission, other government agencies, and private industry. In our mission, we test a wide range of military weapons systems, equipment, and materiel including unmanned ground vehicles. ATC is experienced with connected and automated vehicle testing (up to highway speeds) on primary and secondary roads and can provide data collection, reduction, analysis, and visualization for automotive performance data, Vehicle-to-Vehicle, and Vehicle-to-Infrastructure data.

ATC has over 64 km (40 miles) of automotive test courses comprised of interconnecting paved and unimproved roads on more than 1,335 hectares (3,300 acres) of land. Each automotive test course and facility is designed to meet particular (military) vehicle test requirements and are comparable to and in many cases exceed commercial standards.

A designation and participation in the proposed Community of Practice will allow ATC to share our DoD MRTFB resources with the public and private sectors for advancing automated vehicle technologies

Sincerely,

A handwritten signature in black ink, appearing to read 'M. Bodrick', with a large, sweeping flourish extending upwards and to the right.

Morris L. Bodrick
Colonel, U.S. Army
Commanding



December 19, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

We would like to take this opportunity to express our support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

Founded in 1999, the Army Alliance is an advocacy organization whose sole mission is support the sustainment and growth of Aberdeen Proving Ground (APG), one of Maryland top five employers. ARL, one of APG's major tenants, is already conducting and supporting research and development efforts associated with AV's. APG also has the Army's Automotive Technology Evaluation Facility (ATEF), which enables the Department of Defense (DoD) to effectively, efficiently, and safely conduct high-performance, endurance, and reliability testing on all wheeled and tracked vehicles, of both manned and un-manned ground platforms. By inherent design, this track doubles the amount of possible test miles without increasing required test time. The ATEF is part of the Aberdeen Test Center. Additionally, the Army Alliance is a partner and board member of the Regional Additive Manufacturing Partner of Maryland (RAMP MD). RAMP MD is collaborating with the Edgewood Chemical and Biological Center in providing state of the art additive manufacturing capabilities to local entrepreneurs and companies, some of which are already working in the AV technology space. These are just a couple of the unique assets that are already available in Maryland to support the AV Proving Ground.

Army Alliance, Inc.

2021 Pulaski Highway, Suite D • Havre de Grace • MD 21078
410-838-ARMY and 410-273-1187

www.armyalliance.org

It is for these reasons that the Army Alliance is very excited about continuing to partner with MDOT in supporting the State's current and planned AV testing and implementation endeavors and looks forward to the opportunities that a designation for AV expertise would provide to the region. Maryland is in a unique position with its existing commercial and government assets to significantly contribute to the future of AV research, development, testing, and hopefully implementation in the United States. Therefore, on behalf of the Army Alliance, I am pleased to write this letter of support for the MDOT's application for the Automated Vehicle (AV) Proving Ground designation.

Should you have any questions, please feel free to contact me at (410) 273-1187.

Kind regards,

A handwritten signature in blue ink that reads "Jill McClune". The signature is written in a cursive, flowing style.

Jill McClune
President
Army Alliance, Inc.

December 19, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

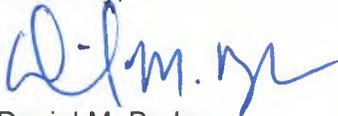
The Battelle Memorial Institute would like to express our excitement and support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. The I-95 Corridor in Maryland is a prime location to expand the significant AV testing and development already underway, along with the proposed manufacturing of software and hardware components in development or in planning.

Battelle is well positioned to help MDOT leverage its current capabilities by bringing our wealth of experience in Connected Vehicle research and development, AV Human Factors expertise, software development and prototype development and testing to Maryland's I-95 corridor. Furthermore, as one of the partners in the USDOT's Smart Cities Challenge in Columbus, Ohio, we are well positioned to help transfer knowledge to Maryland's metropolitan areas. Furthermore, as one of the developers of several prototype Connected Vehicle applications for the USDOT, we understand the Federal research imperative and, along with MDOT, can help bring to bear many of the fruits of these promising AV technologies. Concentrating this corridor as an AV test bed covering development to implementation and production will achieve the federal interest in advancing this technology and the myriad safety and mobility benefits AV technology will provide.

This designation will leverage public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

As partners with MDOT in supporting MDOT's AV testing and implementation endeavors, we look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,



Daniel M. Berler
Leader, Transportation Business Line



UNIVERSITY OF
MARYLAND

Glenn L. Martin Institute of Technology
A. James Clark School of Engineering
Department of Civil & Environmental Engineering



5000 College Avenue
2200 Technology Ventures Building
College Park, Maryland 20742

December 9, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation

Dear Secretary Foxx:

I would like to take this opportunity to express strong support for the Maryland Department of Transportation's (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

The University of Maryland Center for Advanced Transportation Technology (CATT) is committed to support the Maryland Department of Transportation in developing a "one stop shop" for AV technology development in the I-95 Corridor. Specifically, the Center will provide MDOT with the ability to leverage its nationally renowned laboratory – the CATT Lab – to support AV data archiving, data sharing, data analytics, and visualization. In addition, CATT will work in coordination with the University's Autonomous Vehicle Laboratory, Maryland Cyber Security Center, and National Transportation Center to provide MDOT a full complement of AV technology research and development resources.

Together, we are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

Thomas H. Jacobs
Director, Center for Advanced Transportation Technology
University of Maryland



December 16, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

To advance the deployment Automated Vehicle (AV) technology in a safe environment, we strongly support the Maryland Department of Transportation (MDOT) application for a AV Proving Ground along the I-95 corridor because it will pull together key resources and interests to further enhance the AV testing and technological innovation beginning to occur in this corridor.

Maryland's proposed AV Proving Ground along the I-95 corridor would create a "one stop shop" for AV technology development. This "AV Development Pipeline" would weave together advanced testing of level three through five autonomous technology, strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would advance the manifestation of the benefits associated with AV technology. Several intermodal freight facilities along the corridor are ideal for freight AV application testing. In addition, intermodal passenger facilities, train stations and airports located in the MD I-95 corridor offer testing scenarios for connectivity and parking. The receipt of a AV Proving Ground designation would leverage public and private sector investments already being made including the autonomous testing taking place at Aberdeen Proving Ground and the Army Research Lab and the national cyber technology expertise in the Fort Meade area.

The application for designation by Maryland not only serves their jurisdiction, but also benefits the entire I-95 corridor network through shared resources, linking of programs, and multi-agency coordination. Spanning from Maine to Florida, the I-95 Corridor is vital to our country's social, economic and environmental fabric. More than 35% of the nation's VMT occurs in the I-95 Corridor including more than 565 million trips annually that are more than 100 miles. Given the significant passenger and commercial vehicle activity that occurs within the I-95 corridor, it is vital to develop and test new technologies within this unique and challenging corridor. Maryland's advancements in the field of AV technologies, their resources, and their geographic location result in an ideal candidate for an AV Proving Ground.

For more than two decades, the I-95 Corridor Coalition has represented over 100 state transportation agencies, toll authorities, and public safety organizations from Maine to Florida who keep people and goods moving throughout one of the world's busiest transportation corridors and who ensure that are members continue to push innovation. MDOT has been a leader in our organization and their application for an AV Proving Ground designation along the I-95 corridor is yet another example of how one state's innovation can benefit many.

Sincerely,

A handwritten signature in black ink, appearing to read "Patricia G. Hendren".

Patricia G. Hendren, PhD, Executive Director
I-95 Corridor Coalition



December 13, 2016

City of Annapolis
Mike Pantelides
Mayor

Anne Arundel County
Steve Schuh
County Executive

City of Baltimore
Catherine E. Pugh
Mayor

Baltimore County
Kevin Kamenetz
County Executive

Carroll County
Doug Howard
Member, Board of Commissioners

Harford County
Barry Glassman
County Executive

Howard County
Allan H. Kittleman
County Executive

Queen Anne's County
Stephen Wilson
County Executive

Maryland Department of Transportation
Pete Rahn
Secretary

Maryland Department of the
Environment
Ben Grumbles
Secretary

Maryland Department of Planning
Wendi Peters
Secretary

Maryland Transit Administration
Paul Comfort
Administrator

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

Dear Secretary Foxx:

The Baltimore Regional Transportation Board (BRTB), the Metropolitan Planning Organization for the Baltimore region, is pleased to offer its support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages. Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

The BRTB appreciates your favorable consideration of this application. We are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

Clive Graham, Empowered Chair

Offices @ McHenry Row
1500 Whetstone Way, Suite 300
Baltimore, MD 21230
Telephone 410-732-0500
Facsimile 410-732-8248
www.baltometro.org

ROBERT L. FLANAGAN
Legislative District 9B
Howard County

Environment and Transportation
Committee



THE MARYLAND HOUSE OF DELEGATES
ANNAPOLIS, MARYLAND 21401

Annapolis Office
The Maryland House of Delegates
6 Bladen Street, Room 430
Annapolis, Maryland 21401
410-841-3077 · 301-858-3077
800-492-7122 Ext. 3077
Bob.Flanagan@house.state.md.us

District Office
4725 Dorsey Hall Road
Suite A, #204
Ellicott City, Maryland 21042
443-420-8161

December 16, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

As the former Secretary of Transportation for the State of Maryland (2003-07) and as a State Delegate from Legislative District 9B, representing Howard County, I would like to take this opportunity to express my support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

Historic Ellicott City is currently undergoing a master planning process that must include enhanced flood mitigation following a devastating one thousand year flood on July 30, 2016. This is an organic "live where you work", pedestrian friendly community that preserves nearly 250 years of history. Employing AV technology will add optional strategies that might not otherwise be practicable or feasible.

I join with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

A handwritten signature in black ink that reads "Robert L. Flanagan". The signature is written in a cursive, flowing style.

Robert L. Flanagan
Maryland State Delegate
Legislative District 9B – Howard County

BARRY GLASSMAN
HARFORD COUNTY EXECUTIVE



BILLY BONIFACE
DIRECTOR OF ADMINISTRATION

December 16, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Re: Maryland Department of Transportation - Automated Vehicle
Development Pipeline

Dear Secretary Foxx:

I would like to take this opportunity to express our support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

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Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

MARYLAND'S NEW CENTER OF OPPORTUNITY

410.638.3350 | 410.879.2038 | TTY Maryland Relay 711 | www.harfordcountymd.gov

220 South Main Street, Bel Air, Maryland 21014

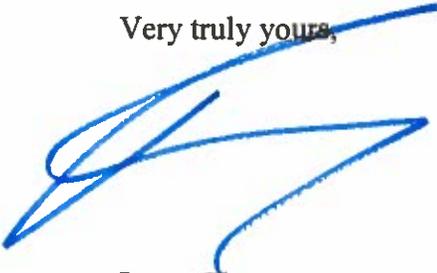
THIS DOCUMENT IS AVAILABLE IN ALTERNATIVE FORMAT UPON REQUEST

This proposed AV designation leverages public and private sector investments already made to support military defense activities at either end of the corridor. Aberdeen Proving Ground and the Army Research Lab are engaged in autonomous testing at one end, and the national cyber technology expertise in the Fort Meade area at the opposite end. Furthermore, Aberdeen Proving Ground, which is situated completely within the confines of Harford County, includes the world renowned Aberdeen Test Center and Munson Vehicle Test Course...famous for their many years of testing excellence for the Department of Defense.

As County Executive of Harford County, I wanted to express the County's commitment in supporting the State of Maryland current and planned AV testing and implementation endeavors. We look forward to the opportunities that a designation for AV expertise will provide to the region.

With every good wish, I remain,

Very truly yours,

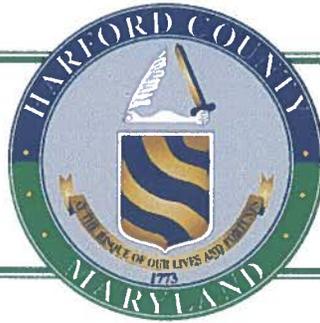
A handwritten signature in blue ink, appearing to read 'Barry Glassman', written over a horizontal line.

Barry Glassman
County Executive

BG/mpm

BARRY GLASSMAN
HARFORD COUNTY EXECUTIVE

BILLY BONIFACE
DIRECTOR OF ADMINISTRATION



KAREN HOLT
DIRECTOR OF ECONOMIC DEVELOPMENT

December 16, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

We would like to take this opportunity to express our support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

Harford County Government and the Harford County Office of Economic Development offers our strongest support for obtaining this Automated Vehicle Proving Ground designation. Such a designation will both maximize existing resources and grow new AV opportunities throughout the region. We value the opportunity to leverage the associated innovative AV technologies to provide greater economic impact along the corridor and further our efforts in commercialization and technology transfer opportunities.

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2021 Pulaski Highway, Suite D, Havre de Grace, MD 21078

THIS DOCUMENT IS AVAILABLE IN ALTERNATIVE FORMAT UPON REQUEST

We are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

A handwritten signature in blue ink that reads "Steven Overbay". The signature is fluid and cursive, with the first name "Steven" and last name "Overbay" clearly legible.

Steven Overbay
Harford County Government
Deputy Director, Economic Development



Leonardo McClarty

President/CEO, Howard County Chamber

December 9, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

The Howard County Chamber of Commerce (Chamber) is a business membership organization whose mission is to provide advocacy, connections, and access to timely information to advance the growth and success of the business community. One way we fulfill this mission is to advocate for local and regional community enhancement projects and partner with organizations that seek to promote economic development and employment opportunities for Howard County businesses and residents.

The Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation accomplishes our business and community development endeavors. Subsequently, we would like to take this opportunity to express our support for the MDOT concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

MDOT Application Support

December 16, 2016

P. 2

We are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

A handwritten signature in black ink that reads "Leonardo McClarty". The signature is written in a cursive, flowing style with a prominent initial "L" and a long, sweeping tail on the "y".

Leonardo McClarty, CCE

President/CEO, Howard County Chamber of Commerce

December 14, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

Maryland Motor Truck Association (MMTA) would like to express our support for the Maryland Department of Transportation's (MDOT's) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

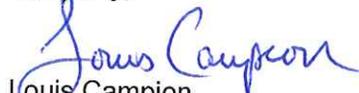
Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

Autonomous vehicles have tremendous potential to enhance safety, improve efficiency and reduce congestion – all fundamental to the delivery of freight movement.

We are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,



Louis Campion
President & CEO

About Maryland Motor Truck Association: Maryland Motor Truck Association is a non-profit trade association that has represented the trucking industry since 1935. In service to its 1,100 members, MMTA is committed to supporting and advocating for a safe, efficient and profitable trucking industry across all sectors and industry types, regardless of size, domicile or type of operation.

December 16, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

On behalf of WSP | Parsons Brinckerhoff, we would like to express our support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting the concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant CV & AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

We support Maryland's "one stop shop" approach and count our firm among the many entities that will contribute as well as benefit from the testing of CV & AV technologies. The presence of so many prestigious academic institutions, military installations, entrepreneurial business interests, and a well-organized state DOT will result in a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in CV & AV testing at one end, and the national cyber technology expertise in the Fort Meade area at the other end.

Our firm has been actively engaged in the CV & AV space for more than a decade, and we recognize the indisputable safety benefits that can be achieved through the rapid development and deployment of advanced transportation technology. We are uniquely positioned to contribute along with other organizations here in the state in order to ensure MDOT has all the national, regional, and local expertise at their disposal.

We are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,



John D. Porcari

President, US Advisory Services
WSP | Parsons Brinckerhoff

Former Assistant Secretary, US Department of Transportation
Former Secretary, Maryland Department of Transportation



Regional Additive Manufacturing Partnership of Maryland • 2021 Pulaski Highway, Suite D, Havre de Grace, MD 21078 • www.rampmd.org

December 13, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

We are writing to wholeheartedly support the Maryland Department of Transportation's (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. The I-95 corridor in Maryland, where there is already a critical mass of capability supporting AV development and testing, will make the perfect home for the MDOT concept of an AV Development Pipeline.

In many ways, with its entrepreneurial entities and advanced testing of level three through five autonomous technology, Maryland's I-95 corridor can be considered a "one stop shop" for AV technology development. There are in place strong public and private collaborations, proven partnerships between academia and employers, and many testing and implementation opportunities to accelerate the development of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

Our organization, the Regional Additive Manufacturing Partnership of Maryland, is extremely interested in the future of AV technology and application because the two industries are closely aligned and integrated. In fact, RAMP MD will be exploring the cross section of additive manufacturing and automated vehicle and aircraft systems at its annual Symposium. We see a great deal of synergy with our mission in establishing a formal AV Development pipeline in the I-95 corridor and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

A handwritten signature in black ink, appearing to read "Rick Decker".

Rick Decker
Executive Director, RAMP MD



National Capital Region
Transportation Planning Board

December 16, 2016

Mr. Anthony Foxx
Secretary of Transportation
U.S. Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Dear Secretary Foxx:

I am writing to express the support of the National Capital Region Transportation Planning Board (TPB), the metropolitan planning organization (MPO) for the National Capital Region, for the Maryland Department of Transportation's application for an Automated Vehicle (AV) Proving Grounds Pilot designation.

The TPB understands that the proposed AV Development Pipeline along the I-95 corridor in Maryland is already home to a significant cluster of facilities involved in automated vehicle testing and software development, as well as the potential manufacture of hardware components required by the automated vehicle industry. As such, Maryland's I-95 corridor is a "one stop shop" for automated vehicle technology development. Advanced testing of level three through five autonomous technologies at facilities along the corridor is ongoing. Strong public and private partnerships, as well as solidified academic partnerships and a diversity of testing and implementation opportunities will continue the development of this corridor as a national center for the advancement and development of automated vehicle systems and components. Intermodal freight facilities along the corridor provide real world testing opportunities for freight AV applications, while the corridor's train stations and airports offer testing scenarios for intermodal passenger connectivity and parking.

Maryland's I-95 AV Development Pipeline leverages the public and private sector investments already made in support of defense-related activities at Aberdeen Proving Ground, Fort Meade, and other locations along the corridor. Designating this corridor an Automated Vehicle Proving Ground Pilot will further the federal interest of advancing automated vehicle technology in the United States and realizing its many potential safety and mobility benefits. The application is also consistent with the TPB's official Vision document, notably the Vision's expressed goal to "use the best available technology to maximize system effectiveness."

The TPB supports Maryland's current and planned automated vehicle testing and implementation endeavors and appreciates your strong consideration of this application.

Sincerely,

A handwritten signature in blue ink that reads "Timothy Lovain".

Timothy Lovain
Chair, National Capital Region
Transportation Planning Board

cc: Ms. Nicole Katsikides, Maryland State Highway Administration



December 16, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

Local Motors (“LM”) would like to take this opportunity to express our support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components in process or in the planning stages. In addition, Local Motors is working with local stakeholders to bring vehicle manufacturing and production to the state.

Maryland’s I-95 corridor is a “one-stop shop” for AV technology development, testing and deployment. Currently, advanced testing of Level 3 through Level 5 autonomous technology is occurring at facilities along the I-95 corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of the I-95 corridor as a center of excellence in the advancement of AV components, systems and vehicles.

We were pleased to respond to the National Highway Traffic Safety Administration’s (“NHTSA”) September 2016 Federal Automated Vehicles Policy by providing our perspective on Highly Automated Vehicles (“HAVs”) and Self-Driving Vehicle (“SDV”) systems. NHTSA’s proposed policy and guidance reflects an important evolution for America’s roadways as they face increased use of HAV and SDV systems. Now that U.S. DOT has iterated on this issue to create a network of certified proving grounds for HAVs around the country across multiple environments and uses case, LM will contribute to Maryland’s submission in a public-private partnership to:

- **Develop and test low-speed vehicles in environments that can pave the way for deployment of HAVs**

Low-speed autonomous vehicles are poised to provide the most meaningful and safe applications within transportation. We will have a focus on multi-passenger vehicles and

LOCAL MOTORS

151 St. George Blvd.
Oxon Hill, MD 20745
+1 (301) 375 1360



parcel delivery vehicles that can operate in both fixed-route and on-demand environments.

- **Test and continuously improve vehicles before deployment**

LM's approach to vehicle commercialization and deployment is unique among vehicle manufacturers. We work with a community of creators, partners and consumers to commercialize vehicles rapidly and continuously make improvements in real time. Often, we develop a minimal viable product that we test in the market to better measure and understand demand for locally relevant vehicles. This approach enables the rapid integration of the latest technology as HAVs and SDVs continue to expand into the commercial and consumer markets. It also enables us to quickly iterate on the data we capture in real-time and apply those lessons in vehicle improvements and upgrades.

- **Better understand required updates to vehicle classifications**

HAVs and SDVs will be deployed in different use cases than traditional vehicles, so we will work with our local partners to also consider the implications on vehicle classification and FMVSS generally. The proliferation of HAVs and their operation in low-speed environments will create meaningful new classes of vehicles. This issue will become more acute as these new vehicles increasingly play a critical role both in downtown city (core) areas, as well as becoming an important "connector" in the more suburban areas where cities continue to struggle to meet rising mass transit demands.

Collaborating with all stakeholders

LM is unique among vehicle makers in our open, co-creative, approach to rapid design, development, manufacturing and upgrade of vehicles. In this open spirit, we look forward to collaborating with Maryland and other industry stakeholders to further the adoption of HAVs and SDVs by the general public to create safer, smarter and more sustainable public roads for all. Local Motors believes that the future of transportation will be redefined by automated and autonomous vehicles, and we stand ready to build and support them.

We are partners with MDOT in supporting the state's current and planned AV testing and implementation endeavors and sit on the Maryland Motor Vehicle Administrator's AV/CV Working Group. We look forward to the opportunities that an Automated Vehicle Proving Ground designation and expertise would provide to our region.

Sincerely,

A handwritten signature in black ink that reads "David Woessner".

David Woessner
General Manager - Greater Washington D.C. Region

LOCAL MOTORS

151 St. George Blvd.
Oxon Hill, MD 20745
+1 (301) 375 1360



December 9, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

We would like to take this opportunity to express our support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

As you are aware AV technology requires both simulated and rigorous real world testing. Maryland's I-95 corridor as proposed by MDOT represents an ideal, highly diverse AV technology development and testing environment. This diversity includes but is not limited to highway, inner city road, signaled and non-signaled intersections, parking, urban smart city centers, airports, train stations and multimodal transportation hand off points (rail to road to air). Aberdeen Proving Grounds (APG) flanks this proposed corridor in the north and private sector entrepreneurial companies and Universities in the south. This diversity allows everyone from military establishments, AV freight, commercial fleet vehicle and passenger car, traffic management, and AV component companies to accelerate development through realistic testing.

The Maryland I-95 corridor is one of a handful of sites nation-wide qualified to present all of the above cases under diverse climatic conditions. There cannot be a more holistic yet sectionable ecosystem. It will also be a "one stop shop" for real world monitoring and exercises the national transportation infrastructure readiness to handle the scale, sophistication and incident response capability that a mass scale AV deployment would bring. It also would allow the State and the federal government to closely monitor and prepare for mixed-use scenarios (partial AV, fully AV and non-AV vehicles).

STEER is focused on building automated driving applications that are truly driverless, situationally robust and cyber hardened and catalyze the adoption of automated technology at the mass-market level. We believe that Maryland's progressive history of innovation, access to the nation's most arterial inter state transportation routes and modes, strong

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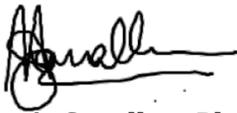
urban cores and diverse workforce is ripe for development and early geo-fenced deployment of highly automated vehicles. STEER is currently working with MDOT, supporting academic and public private partnerships, and leveraging our cyber security and transportation background to support the state to lead the nation in developing the next generation transportation system that is intelligent, connected, automated and cyber robust.

The MDOT I-95 Corridor Autonomous Vehicle Proving Ground Designation will leverage the State's infrastructure investment and the wealth of private sector activity supporting federal institutions to spur growth in mobility, enhance urban and smart growth planning, and transform the technology workforce and overall economics in the state.

We are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and their highly inspiring vision for the future of urban mobility and look forward to the opportunities that a designation for AV expertise would provide to the us and the greater region.

Please do not hesitate to call upon us if you wish to see the promising results of this partnership as we move forward in reshaping the transportation landscape together.

Sincerely,



Anuja Sonalker, Ph.D
Founder, CEO



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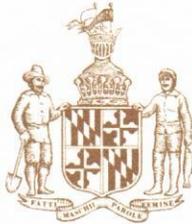
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WAYNE NORMAN
Legislative District 35
Harford and Cecil Counties

Judicial Proceedings Committee

Joint Committee on Legislative Ethics



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11 Bladen Street, Room 315
Annapolis, Maryland 21401
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800-492-7122 Ext. 3603
Fax 410-841-3115 · 301-858-3115
Wayne.Norman@senate.state.md.us

THE SENATE OF MARYLAND
ANNAPOLIS, MARYLAND 21401

December 13, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Harford District Office
P. O. Box 692
Churchville, Maryland 21028
410-734-6471 · Fax 410-734-6472

Cecil District Office
64 South Main Street
Port Deposit, Maryland 21908
410-378-2718

Dear Secretary Foxx:

I would like to take this opportunity to express my support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

As the Chairman of the Harford County Senate Delegation, I join with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

A handwritten signature in black ink that reads "Wayne Norman".

Wayne Norman
Maryland State Senator, District 35 (Harford & Cecil Counties)
Chairman, Harford County Senate Delegation



Larry Hogan | Governor
Boyd Rutherford | Lt. Governor
R. Michael Gill | Secretary of Commerce
Benjamin H. Wu | Deputy Secretary of Commerce

December 16, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

We would like to take this opportunity to express our support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

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We are partners with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,



R. Michael Gill
Secretary of Commerce

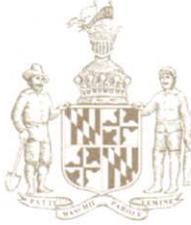
PAMELA G. BEIDLE
Legislative District 32
Anne Arundel County

Environment and
Transportation Committee

Subcommittees

Housing and Real Property

Chair, Motor Vehicles
and Transportation



The Maryland House of Delegates
6 Bladen Street, Room 165
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Pamela.Beidle@house.state.md.us

The Maryland House of Delegates

ANNAPOLIS, MARYLAND 21401

December 14, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

I would like to take this opportunity to express support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area.

The area I represent is the home to many technology companies that this designation would benefit. We are a transportation cross roads, with direct access to BWI Marshall Airport, the Port of Baltimore, and I-95, and we have many technology agencies and contractors.

As the Chairwoman of the Anne Arundel County House Delegation, I join with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

A handwritten signature in blue ink that reads "Pamela G. Beidle".

Pamela G. Beidle

Maryland State Delegate, District 32, Anne Arundel County
Chairman, Anne Arundel County House Delegation
Environment & Transportation Committee,
Transportation Sub-Committee Chairman

JAMES BROCHIN
Legislative District 42
Baltimore County



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Judicial Proceedings Committee
Executive Nominations Committee
Joint Committee on Legislative Ethics

Chair
Baltimore County Senate Delegation

THE SENATE OF MARYLAND
ANNAPOLIS, MARYLAND 21401

District Office
Beltway Professional Building
1134 York Road, Suite 200
Lutherville-Timonium, Maryland 21093
410-823-7087

December 13, 2016

The Honorable Anthony Foxx, Secretary
United States Department of Transportation
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

Dear Secretary Foxx:

I would like to take this opportunity to express my support for the Maryland Department of Transportation (MDOT) application for the Automated Vehicle (AV) Proving Ground designation. MDOT is submitting a concept of an AV Development Pipeline along the I-95 corridor in Maryland where there is currently significant AV testing, development and proposed manufacturing of software and hardware components already in action or in the planning stages.

Maryland's I-95 corridor is a "one stop shop" for AV technology development. There are current entrepreneurial entities and advanced testing of level three through five autonomous technology occurring at facilities along the corridor. There are also strong public and private partnerships, solidified academic partnerships, and a diversity of testing and implementation opportunities that would continue the acceleration of this corridor as a national center for the advancement of AV components. Specifically, intermodal freight facilities along the corridor are perfect for freight AV applications, and our intermodal passenger facilities, train stations and airports, offer testing scenarios for connectivity and parking. Concentrating this corridor as an AV development to implementation and production center will achieve the federal interest in advancing this technology and the safety and mobility benefits AV technology will provide.

This designation leverages public and private sector investments already made to support defense activities at either end of the corridor with Aberdeen Proving Ground and the Army Research Lab, which is engaged in autonomous testing, at one end, and the national cyber technology expertise in the Fort Meade area. As such, and as the Chairman of the Baltimore County Senate Delegation, I join with MDOT in supporting the State's current and planned AV testing and implementation endeavors and look forward to the opportunities that a designation for AV expertise would provide to the region.

Sincerely,

A handwritten signature in black ink, appearing to read "James Brochin".

Senator James Brochin
42nd Legislative District