CONNECTED AND AUTOMATED VEHICLE

2020 ACCOMPLISHMENTS
& THE ROAD AHEAD

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

December 2020

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STATE HIGHWAY ADMINISTRATION

INTRODUCTION

The Maryland Department of Transportation State Highway Administration (MDOT SHA) has been advancing connected & automated vehicles (CAV) initiatives since the release of its 2017 MDOT SHA CAV Strategic Plan. As the years progressed, dedicated staff advanced and made a record of efforts to track and realign initiatives for optimized results. This document continues the trend from past years to record CAV efforts at MDOT SHA in annual accomplishments report. Previous year reports are available upon request or online at MDOT SHA's Office of Transportation Mobility and Operations webpage.

Disclaimer: The statements recorded in this report are for the **MDOT SHA CAV program only**, which is internal to MDOT SHA. There is also a Maryland Statewide CAV Working Group that advances statewide CAV initiatives. This report **does not** reflect statewide accomplishments from that group. For more information the Maryland Statewide CAV Working Group please visit ⊕ http://mdot.maryland.gov/MarylandCAV.

⊕ *This is a link, check the digital copy for access to the resource*

STATUS OF 2020 PRIORITIES

CAV initiatives are strongly supported by both MDOT SHA agency leadership and the internal CAV working group, which is comprises over 50 MDOT SHA staff, consultants, and partners. The internal group meets bimonthly and is instrumental in aligning CAV initiatives across multiple offices for the cross collaboration of ideas and solutions. Each working group meeting provides updates and requests recommendations for future actions to ensure eventual adoption by all MDOT SHA offices and districts. At the end of each calendar year, this internal working group is asked to evaluate the CAV progress made at MDOT SHA that year. The responses are used to realign, as necessary, the following year's priorities, which in turn should advance the MDOT SHA 2021-2025 CAV Implementation Plan.

Figure 1: Estimated timeline of deliverables from the **2019 Accomplishments & The Road Ahead** report

In the following pages, the priority and goal outlined earlier in the 2019 year will be described and then a list of accomplishments meant to meet that goal are summarized. After each list, the results of the internal CAV working group's evaluation of said accomplishments is reported, including comments from respondents.

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SUPPORT CAV DEPLOYMENT EFFORTS

Goal: Pursue CAV-type deployments within MDOT SHA.

- Piloted HAAS Alert ⊕ connected vehicle technology on 3 types of fleet vehicles.
- MDOT SHA's Office of Materials Technology now has access to the Office of Transportation Mobility & Operations' 50+ Mobile Automated Roadway Weather Information System (MARWIS) devices.
- Advanced the national Signal Phase and Timing (SPaT) Challenge with expected deployment in Spring 2021.
- Advanced the State Transportation Innovation Council (STIC) Grant to deploy Connected Vehicle (CV) technology for pedestrian safety with an expected deployment in Winter 2021.
- Completed the MDOT SHA-wide ITS Communications Plan.
- Submitted various grant applications:
    - US Department of Transportation's (USDOT) Advanced Transportation and Congestion Management Technologies Deployment Program (ATCMTD) grant for connected vehicle applications (not awarded).
    - Morgan State University's submission to the Inclusive Design Challenge.
    - National Harbor Olli demonstration team (Local Motors, Robotic Research, Prince George's County, and University of Maryland) submission to the USDOT Accelerated Innovation Deployment (AID) grant (not awarded).

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Survey Findings

Below Expectations	Met Expectations	Exceeded Expectations
0%	**55%**	**45%**

"

Respondent comments:

- Focus on keeping the US-1 Pilot on track for the new anticipated schedule.
- Follow national industry & look at other state deployment strategies to mirror [in Maryland].
- The only thing stopping you from achieving "exceeded expectations" was the ongoing delay in implementing the US 1 SPaT Challenge deployment.
- [Want to see] more cars & RSU deployments on the streets for testing.
- I think the SHA program has done a lot given the level of bureaucracy it has to operate in related to CAV in Maryland. It would be nice if [MDOT] SHA had some autonomy that did not have to go through other modal administrations. [MDOT] SHA knows best what it needs to do.
- That's a lot! Focus for 2021, just continue outreach/sharing data with locals, as well as continue finding other projects to deploy and making sure projects are deployed equitably. **"**

DEVELOP TECHNOLOGY-BASED PROJECT LIST

Goal: To develop a library of potential CV technology projects that can be used for grant applications or TSMO projects.

This priority has failed over the past three years to generate a technology-based project list for MDOT SHA to depend upon for grant applications. Throughout the 2020 calendar year, only projects outlined in the ITS Communications Plan were defined for possible future implementation.

Survey Findings

Below Expectations	Met Expectations	Exceeded Expectations
40%	**40%**	**20%**

"

Respondent comments:

- Have project concepts "on the shelf" to respond better to Federal Grant requests.
- Keep outreaching more.
- MDOT SHA should begin to identify technology projects as soon as possible (if it has not already begun doing so) and be less concerned about obsolescence of a given technology.
- Since we didn't perhaps we should have a public list of our projects.
- Internal education may have helped with the "Develop Technology Based Project List". [MDOT] SHA stakeholders identify projects that directly impacted their line of business. The CAV Solutions toolbox may help with this in 2021.
- Would the ITS Communications Plan, with updated fiber map, be considered a project?
- [MDOT] SHA needs to advance its technology to support CAV. This includes the infrastructure for ITS and also the capability to use data that is available from CV in lieu of some things like sensors.
- As this [list] is developed maybe work with locals to figure out how to incorporate into CTP/TIP process; this may tie into the CAV solutions toolbox.

"

INTERNAL & EXTERNAL EDUCATION

Goal: to create and distribute CAV material to internal staff and external partners so CAV becomes more mainstream across Maryland.

- Hosted one CAV Training Session with the Chesapeake Math and IT Academy.
- Hosted a CAV 'table' at the annual Maryland Quality Initiative Engineer's week Science Technology Engineering & Math (STEM) event at the Engineer's Club.
- Presenter at two Washington D.C. Section Institute of Transportation Engineers (WDCSITE) middle and high school level STEM events related to CAV.
- Created an American Association of State Highway and Transportation Officials (AASHTO) Transportation and Civil Engineering (TRAC) CAV educational module for national distribution to middle and high school students & piloted training with Maryland and Michigan schools.
- Did **not** host the MDOT SHA webinar on CAV workforce impact (identified in 2019).

Survey Findings

Below Expectations	Met Expectations	Exceeded Expectations
0%	**70%**	**30%**

"

Respondent comments:

- Share real stories.
- Perhaps identify and implement a balanced training plan that covers for both internal and external audiences? Most of the 2020 CAV Education accomplishments were externally focused.
- Great job with education and in particular for youth - still feel you need a legislative briefing for Maryland's elected legislators.
- Maybe partner with the CCBC Transportation program and work on developing a CAV ready workforce, transportation data technicians, etc.
- Sponsor a lunch and learn as many in [MDOT] SHA are curious about this.
- More agency wide webinars.
- MDOT SHA seems to have established a good baseline for CAV education. Perhaps identify and implement a balanced training plan that covers for both internal and external audiences? **"**

SUSTAIN NATIONAL & REGIONAL INVOLVEMENT

Goal: To demonstrate MDOT SHA's involvement in CAV both locally and at the National level

- Lead contributor to The Eastern Transportation Coalition (TETC) AV readiness project.
- Active stakeholder in national CAV initiatives, including the AASHTO National Strategy & USDOT Concept of Operations for roadway automation.
- Pulled local jurisdiction knowledge into the development of the national Connected Vehicle Pooled Fund Study effort to record MAP messaging lessons learned.
- Chair for an NCHRP20-102(27) effort to estimate timeline of CAV deployments nationally.
- MDOT SHA in partnership with the Secretary's Office deployed a survey to local jurisdiction to identify their needs relating to emerging technologies.

Survey Findings

Below Expectations	Met Expectations	Exceeded Expectations
0%	**55%**	**45%**

Respondent comments:

- Partner with private companies.
- Keep doing what you're doing - Maryland is recognized as a national player once again!
- These accomplishments for 2020 seems impressive and proper. So, I would recommend staying the course and maintaining the above initiatives.

AGENCY READINESS EFFORTS

Goal: To demonstrate MDOT SHA's involvement in CAV both locally and at the National level

- Creation of an automation readiness draft framework (*on hold*).
- Evaluation of impact to MDOT SHA workforce given automation in snow plowing, mowing, and truck mounted attenuators.
- Revised the 2017 MDOT SHA CAV Strategic Plan to a 2021-2025 MDOT SHA CAV Implementation Plan.
- Secured funding for a Maryland law review to identify the legal impacts of CAV on statutes & support future CAV legislation in Maryland.
- Creation of a CAV Solutions toolbox with over 60+ possible strategies.
- Integration of CAV pedestrian safety solutions into the Strategic Highway Safety Plan (SHSP).
- Secured minor annual State Planning & Research fund allocation for the CAV program.

Survey Findings

Below Expectations	Met Expectations	Exceeded Expectations
0%	**50%**	**50%**

"

Respondent comments:

- Re-evaluate [this category] based on remote webinars/outreach.
- Great job on the planning aspects of readiness! Still need more "field experience" with devices.
- These accomplishments seem proper and should be maintained for the following year.
- Focus on executing the 2021-2025 MDOT SHA CAV Implementation Plan in 2021.
- [MDOT] SHA needs the autonomy to work with the Maryland legislature to get the permissions it needs to allow for CAV.
- Secure more funding.

"

2020 OVERALL CAV PROGRAM EVALUATION

The below summarizes the overall CAV program evaluation results from respondents for 2019.

Survey Findings

Below Expectations	Met Expectations	Exceeded Expectations
0%	**40%**	**60%**

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Respondent comments:

- The CAV program has done an excellent job.
- Begin thinking about a change in agency leadership after the next election, and institutionalize as much of your program as possible to help safeguard it from political shifts.
- [Consider] more outside involvements from technology companies.
- Given the challenges posed by the pandemic and resultant economic climate, all of MDOT SHA's accomplishments in 2020 regarding CAV were significant and (at least, in my opinion), exceeded expectations.
- Please keep up the good work!
- Congratulations on completing so many CAV initiatives in 2020!
- [MDOT SHA] accomplished a lot over the past year, kudos to you and the team!

"

2021 PRIORITIES

In 2021, MDOT SHA will enter its fourth year of official CAV initiatives. As demonstrated through annual reports and documentation of our efforts, our team continues to expand the realm of possibilities. The following summaries strategies MDOT SHA will undertake in 2021, which align with the 2021-2025 MDOT SHA CAV Implementation Plan. Under each of these categories, initiatives have been outlined based on the feedback summarized in the previous pages. It is expected each of these efforts will be completed or close to completion by the end of calendar year 2021.

SUPPORT CAV DEPLOYMENT EFFORTS

Investigate and pursue EV-CAV synergies.

Deploy at least one automated vehicle solution.

INTERNAL AND EXTERNAL EDUCATION OF CAV

Pursue more internal education of CAV.

- Establish quarterly MDOT SHA wide CAV Lunch and Learn webinars.

- Generate up to 6 "CAV in 60 seconds" 'vblog'-type material.

Continue external collaboration with local jurisdictions and other agencies.

Generate more collaboration opportunities with private sector.

- Review the current innovation pipeline process to support private vendor partnerships internally to MDOT SHA.

- Distinctions of P3 versus joint ventures on small project values.

SUSTAIN NATIONAL & REGIONAL INVOLVEMENT

Participation in National Committees

- For a current list of national efforts MDOT SHA is directly involved in, please see the 2021-2025 MDOT SHA CAV Implementation Plan.

Statewide MDOT CAV Working Group

- Participate in Coordination Team & SubGroup meetings.

- Lead the implementation of the CAV Strategic Framework.

Development of Maryland's CAV Ecosystem Vision

- Perform at least one public workshop to engage the public in CAV.
- Establish strategies through Metropolitan Planning Organization liaisons that engages local jurisdictions.
- Create a vision of possible CAV deployments in specific operating design domains for Maryland communities to visualize how CAV can change their quality of life.

READINESS EFFORTS

Investigate & write report of candidate locations for deployment of CAV technology, to include low hanging fruit technologies, such as:

- Queue around curve warnings.

- Autonomous vehicle solutions: truck mounted attenuators, parking, and snow plowing.

- Freight automation solutions (including parcel delivery).

- Roadway asset monitoring through CAV crowdsourced information.

- Messaging of incident or roadway conditions over CV devices.

Perform full scale readiness assessment of MD facilities using 2020 Framework

- Updated versions of the readiness effort are available through the TETC and separate state initiatives.

- Generate readiness scale on various corridors, at minimum to consider freight, urban, rural, vulnerable user, multimodal regions, etc.

Update standard operating procedures for low hanging fruit CV strategies

Include CAV solutions in 2021 HSIP

Update ITS Architecture

Complete Maryland Law Review

- Effort has already been funded and will kick-off in January 2021 (12-month effort).

Perform an analysis of the safety benefits CAV technology could have in Maryland

- Review in detail all crash data & types for one calendar year (likely 2019 given 2020 anomaly with pandemic).

- Create an evaluation strategy for which crashes could have been minimized or eliminated through Automated Driving Systems (ADS) technology and full AV capabilities.

- Perform a return on investment value added of ADS and AV technology.

- Summarize as key talking points for executive leadership.

Secure funding for the creation of a data exchange portal

- 2-way data exchange with vendors and external parties

- Include data feeds for SPaT, MAP, Basic Safety Messages, roadway maintenance, etc.

- Highlight real-time warnings, including high truck turn-over locations (e.g. Drivewyze).

- Possible data feeds to ingest from external parties:

    o High instances of near-miss locations (specifically intersections and active lane closure areas).

    o High or sudden instances of windshield wipers on or sudden braking.

- Tie in lessons learned from the ongoing Florida data exchange portal currently underway.

CLOSING THOUGHTS

The CAV program within MDOT SHA pursues innovation for the agency but ultimately continues to serve the purpose of advancing more efficient solutions to aiding our communities travel safer, more efficiently, and in a more equitable manner. The MDOT SHA continues to work together to make progress toward making our CAV Program a reality for the citizens of Maryland. We look forward to sharing our 2021 successes and beyond with you in the years to come, and offering our customers a roadway network and technology infrastructure that can support the use of CAV.

If you have any questions related to this report, please contact the MDOT SHA CAV Program Manager at SHACAV@mdot.maryland.gov.

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