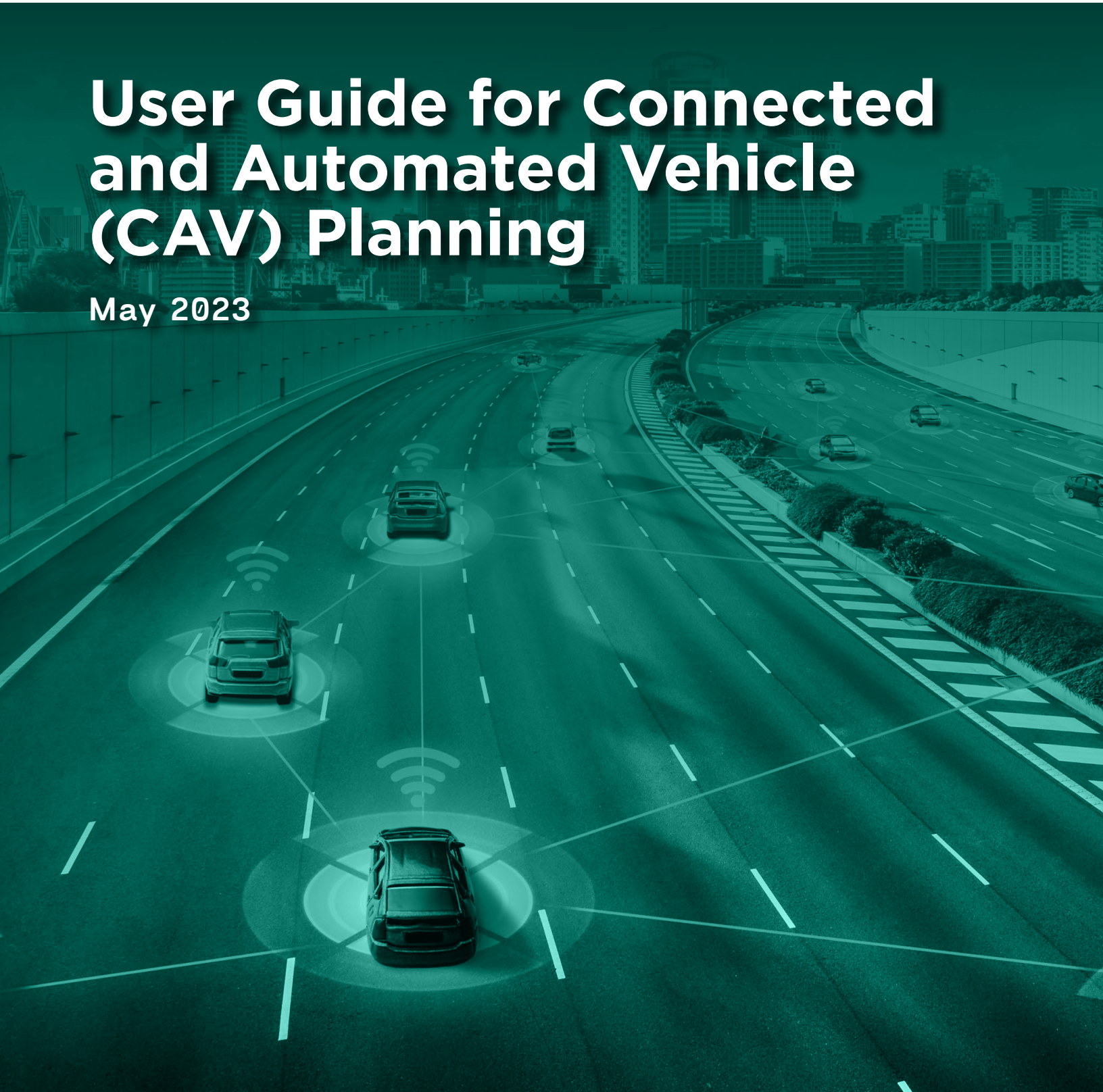
BALTIMORE METROPOLITAN COUNCIL

User Guide for Connected and Automated Vehicle (CAV) Planning

May 2023



CAVs will impact the transportation planning and policy development processes. How should local agencies prepare? The Baltimore Metropolitan Council (BMC) created the *CAV Planning Guide:* Recommended Actions for Local Agencies to Prepare for Connected and Automated Vehicles. The CAV Planning Guide outlines the potential impacts of CAVs. It recommends actions agencies in the Baltimore region can take to prepare for their arrival.

This User Guide for CAV Planning supplements the plan by helping agencies proactively implement the actions over the next 1-2 years.

How to Use this User Guide

Where should you begin?

- Read the CAV Planning Guide.
- Collaborate within your applicable local agency(s), Baltimore Metropolitan Council (BMC), and the State to complete this User Guide for CAV Planning.
- Refer to the *CAV Planning Guide* for the full recommendations and additional details.
- Refer regularly to this User Guide for CAV Planning to track progress and to identify next steps. Come back to this guide to periodically update your progress as you implement the actions and update other plans and policies.

This User Guide for CAV Planning walks users through the *CAV Planning Guide* using key questions to consider and checklists of steps to take action and build organizational readiness for CAVs. The User Guide for CAV Planning is divided into topic areas (below) mirroring the *CAV Planning Guide*. Click a topic to navigate directly to the section or scroll down to begin.

- *Coordination*
- *Organizational Readiness*
- *Safety*
- *Freight and Goods Delivery*
- *Equity and Accessibility*
- *Planning and Land Use*
- *Funding, Financing, and Fiscal Health*
- *Travel and Mobility*
- *Workforce and Education*
- *Physical Infrastructure*
- *Data Privacy and Security*

Next Steps

Your jurisdiction has worked through the User Guide for CAV Planning. Now what? Put these actions into practice!

- Coordinate your actions with peer jurisdictions, BMC, and the State.
- Establish timely recurring touchpoints with your agency's staff to check-in on the status of each recommended action.
- Include CAV-supporting projects in Capital Investment Program (CIP), Transportation Improvement Program (TIP), and other plans.
- Implement necessary policy changes and internal agency practices, procedures, and actions.
- Consider sponsoring a pilot demonstration program.

Organizational Readiness: Coordinate across agencies

This is a cross-cutting overall recommendation. See: Organizational Readiness (Page 18 of the CAV Planning Guide)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Monitor and coordinate with Maryland's statewide guidance on CAVs. Coordinate local plans with BMC. **Why?** For successful sharing of best practices, securing funding, and avoiding siloed localized CAV planning efforts, it is critical to the extent practical to coordinate and align local preparedness actions with existing state guidance. **Who?** BMC, Transportation and Planning Departments	☐ Review existing State guidance on planning for CAVs. ☐ Assign staff to participate in existing meetings to engage the State, BMC, and surrounding jurisdictions. Work with BMC to identify any additional opportunities and resources for collaboration not identified below. Examples of coordination meetings include: ☐ CAV Working Group ☐ CAV Emergency Responder Subgroup ☐ CAV Freight Subgroup ☐ CAV Policy Subgroup ☐ CAV Technical Subgroup ☐ Baltimore City Micromobility Committee ☐ Maryland Association of Counties (MACo)	Key state and BMC guidance to carry forward into local plans: List staff who will participate in each meeting: Identify industry contacts for additional local CAV planning or deployment meetings (if applicable):

Page 16 provides space for additional notes, if needed.

Organizational Readiness: Define your agency's vision and goals for emerging technology

See: Organizational Readiness (Page 18)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Define your agency's vision for emerging technologies relative to other agencies and existing state, regional, and local goals. Set clear priorities and goals for safety, efficiency, sustainability, equity, and reliability. **Why?** Maintain a clear overall vision for the adoption of transportation technology. Lack of clarity can lead to agencies getting distracted by new technological advancements and losing sight of the big picture. **Who?** Transportation Department	☐ Define your agency's vision for emerging transportation technologies. Agencies should plan for applications of technology, rather than specific technologies, which may change over time. ☐ Set clear priorities and goals for emerging technologies, including safety, efficiency, sustainability, equity, and reliability. ☐ Assess alignment of existing plans with goals.	Enter your agency's vision and goals: List potential performance measures and data sources (see Data Privacy and Security step below for additional details):

Plan	Aligns	Needs Work	Other
Comprehensive Land Use Plan	☐	☐	
Transportation Plan	☐	☐	
Active Transportation Plan	☐	☐	
Other:	☐	☐	

Organizational Readiness: Identify CAV Partners

See: Organizational Readiness (Page 18)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Identify a range of potential partners to provide information, solicit feedback, coordinate efforts, and educate staff, including: • Emergency responders • Underserved communities and disability advocacy groups • Private developers • CAV fleet operators and deployers **Why?** Include a wide range of perspectives early in the planning process. **Who?** Planning and Transportation Departments, BMC (in coordination with community groups)	☐ Identify CAV planning partners. ☐ Regularly engage and collaborate with partners to build consensus on vision and goals (example: Baltimore City's Micromobility Committee meetings).	List your key partners for emerging transportation technology (example: Maryland CAV Working Group): List local underserved community and disability advocacy groups, partners, and points of contact:

Organizational Readiness: Nominate a champion in your agency

See: Organizational Readiness (Page 18)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Nominate a CAV champion(s) in your agency who will participate in partnerships and working groups (like the Maryland CAV Working Group) to stay informed about national trends, advocate for your agency's CAV vision, and work across internal offices to break down silos. **Why?** Local agencies that have successfully implemented emerging technologies have one thing in common—a champion. Pilot deployments and sustainable services take years to implement. These champions need to be dedicated and committed to the long-term efforts in the community and region. **Who?** All agencies and jurisdictions	Identify a champion (s) who is: ☐ Well-networked throughout the local jurisdiction(s) ☐ Passionate about implementing new technologies ☐ Motivated to push for a project's success ☐ Pragmatic about how technology can be realistically used to support local goals	Enter your champion(s), organization, and contact information below:

Safety

See: Safety (Page 14)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Develop goals and performance measures for CAV deployment safety. Collaborate with industry to monitor safety performance of local CAV deployments. **Why?** CAVs should meet or exceed the core driving competencies of a human driver and follow all rules of the road. **Who?** Transportation and Planning Departments, Local CAV Champions	Develop safety goals, metrics, and plans for local CAV deployments: ☐ Develop safety goals and performance metrics for local CAV deployments (see Vision and Goals step above). ☐ Review existing state or local Emergency Response Plans from local CAV deployers. ☐ Monitor safety performance of local CAV deployments (if applicable). ☐ Schedule weekly meetings with local CAV deployers to discuss safety and operational performance (if applicable). ☐ Assign staff to join the Emergency Responder Subgroup of Maryland's CAV Working Group	Define local CAV deployment safety goals: List CAV deployment safety performance measures and potential data sources: Identify industry contacts for local CAV deployment safety meetings (if applicable):

Freight and Goods Delivery

See: Automated Freight & Goods Delivery (Page 16)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION

Collaborate with industry and developers to identify freight-specific needs.
 	
Why?
CAV applications may be adopted for freight and goods delivery before widespread adoption for passenger movement. The trucking industry's small operating margins would benefit from the potential labor cost savings from CAVs.
 	
Who?
Transportation and Planning Departments
	☐ Assign staff to join the Freight Subgroup of Maryland's CAV Working Group
	
	☐ Join the BMC Freight Movement Task Force (FMTF):
	  ☐ Identify subgroup meeting schedule.
	  ☐ Assign staff to participate in meetings.
	☐ Meet with private developers of commercial and industrial sites and with freight/goods movement CAV deployers to understand needs for CAV truck access, loading/unloading, truck parking, and electric-CAV truck charging.
		Identify specific needs for freight and goods delivery (For example: Automated truckports; well-connected, ADA-compliant networks of sidewalks and bike lanes for personal delivery devices; vertiports for urban air mobility; and medium- and heavy-duty EV charging):

Equity and Accessibility

See: Equity & Accessibility (Page 20)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Update local policies to help CAVs achieve desired equity and accessibility outcomes. **Why?** Keep equity and accessibility at the forefront of CAV planning and policy to the technology does not create new barriers. **Who?** All agencies and jurisdictions	☐ Adopt agency equity and accessibility goals (see Vision and Goals step above). ☐ Identify equity and accessibility partners (see Identify Partners step above). ☐ Update procurement policies for CAV goods and services to achieve equity and accessibility goals.	Write down your local jurisdiction's equity and accessibility goals (see Vision and Goals step above): List your equity and accessibility partners (see Identify Partners step above): Identify new equity and accessibility language (based on the goals above) to include in all procurement documents and RFPs:

Planning and Land Use

See: Planning and Land Use (Page 22); Freight and Goods Delivery (Page 16)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Integrate desired outcomes of CAVs and other emerging transportation technologies into long-range regional travel demand models, Comprehensive plans, building and zoning codes, and design manuals. **Why?** Anticipate potential shifts in curb space management, right-of-way allocation, land use and land use patterns, and design and maintenance standards to future-proof your investments. **Who?** Planning and Transportation Departments	Coordinate within your local agencies to assess, monitor, and update the plans considering these example questions (Source: NCHRP Report 924, Chapter 5: Self-Assessment): ☐ Do zoning and land use regulations address the transitioning of uses as technologies evolve? ☐ Do your agency's standard roadway cross-sections and designs allocate sufficient curbside space and travel right of way for vehicles and pedestrians under anticipated usage patterns with new technologies such as e-bikes, e-scooters, and CAVs? ☐ Does your agency follow the latest Manual on Uniform Traffic Control Devices (MUTCD) and state signing and striping standards to support the safe introduction of new technologies? See MDOT's 2022 Standard Specifications for Construction and Materials for additional information. ☐ Are curbside zones and markings adequate for the new parking and pick up/drop off patterns? ☐ Do land use codes for commercial and industrial land uses consider fleet charging, fiber optic networks, and truck parking needs? ☐ Do building codes provide sufficient flexibility to accommodate new technologies (e-commerce, automated delivery, EVs, etc.) ☐ Do travel demand models and travel forecasts reflect anticipated trends in technology?	Zoning Code recommended updates: Comprehensive/General/Small Area and Neighborhood Plans recommended updates: Building Codes recommended updates: Design Manuals recommended updates: Other:_____ Recommended updates:

Funding, Financing, and Fiscal Health

See: Funding, Financing, and Fiscal Health (Page 24)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Plan for impact of CAVs on local fiscal health, including impacts to transportation revenue, development fees, and operations and maintenance costs. **Why?** CAVs could have significant effects on transportation funding at all levels of government, including: • Reduced motor fuel tax revenue (Statewide and potentially impacting Highway User Revenue HUR) • Reduced traffic violation revenue • Reduced parking revenue • Reduced transit revenue • Reduced vehicle registration and sales tax revenue • Increased tolling revenue **Who?** Local jurisdictions, BMC, Elected Officials, and Maryland Department of Transportation	☐ Document current local transportation revenue sources and trends (see examples to the left). ☐ Monitor and evaluate current revenues and potential alternative revenue streams. ☐ Identify and prioritize potential new revenue strategies (see Funding, Financing, and Fiscal Health section of CAV Planning Guide). ☐ Assess infrastructure costs (installation and maintenance) and engage the private sector and the public on funding options.	Document specific FY23 dollar amounts and percentage of overall local revenue for local transportation revenue sources and compare to previous years:

Travel & Mobility

See: Travel and Mobility (Page 26); Safety (Page 14); Equity (Page 20)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Safely accommodate all users of the transportation system, including people with disabilities, pedestrians, bicyclists, transit riders, freight, and drivers. **Why?** CAVs alone will not solve inhospitable land use patterns and a built environment designed for personal vehicles. CAVs may increase dependence on vehicles to travel, reinforce car-oriented sprawl, and increase VMT. Changes in land use to encourage active transportation (e.g., walkable, bikeable, shorter trips) can help negate potential challenges CAVs may create, while also better serving today's travelers. **Who?** Transportation Department or owner of roadway facility	☐ Adopt and implement Complete Streets and Slow Streets policies. ☐ Update and integrate street design standards to prioritize non-auto traffic and manage traffic speeds to encourage a safer environment for all road users. ☐ Share planned work zone and road closure data with trip planning applications like Waze or Google Maps to improve safe navigation for CAVs and human drivers.	What local policies or street design standards currently exist in your jurisdiction to prioritize multimodal mobility (for example: Complete Streets, Slow Streets, Vision Zero, street design standards, Emerging Mobility regulations, etc.): Brainstorm and list potential prioritization factors for multimodal project selection (examples below): • Infrastructure condition • Equity lens (near underserved communities) • Bicycle of pedestrian level of comfort • Proximity to transit • Safety improvement

Workforce & Education

See: Workforce and Education (Page 28)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Invest in people by improving local agency staff expertise and educating the next generation in CAV-related skills, from planning to deployment, operations, and maintenance. **Why?** CAV technology and its applications will impact the workforce by replacing some existing jobs with automation and requiring new skill sets or retraining. **Who?** All departments	☐ Develop work force plan to identify current skills, potential gaps in skills needed, and strategies to fill the gaps through hiring or training. ☐ Partner with local trade schools or colleges. ☐ Partner with CAV vendors through RFIs or RFPs to identify and understand potential applications. ☐ Coordinate and advocate for State education and training programs	Self-assess your local agency staff expertise. List the most important gaps in skillsets you see that will be needed in the future: Review job descriptions and develop language additions and revisions. Reference the MDOT State Highway Administration (SHA) CAV Implementation Plan (Page 27) for resources and guidance: List potential local trade school or university partners:

Physical Infrastructure

See: Physical Infrastructure (Page 30); Freight and Goods Delivery (Page 16)

NEAR-TERM RECOMMENDATION	STEPS TO TAKE ACTION	IMPLEMENTATION
Maintain infrastructure in a state of good repair. **Why?** Local governments will need to assess the state of their transportation infrastructure and identify any upgrades that may be necessary to support the deployment of CAVs. This will benefit all system users. **Who?** Facility owner; BMC and BRTB can serve as a forum to help facilitate coordination across jurisdictions and facility owners	☐ Collaborate with CAV industry to assess current infrastructure and provide infrastructure baselines and guidelines. ☐ Identify potential future physical infrastructure requirements (crosswalks, striping, and signage). ☐ Identify potential future digital infrastructure requirements (high-speed communication, data). ☐ Advocate for increased maintenance and operations funding.	Assess existing conditions and critical infrastructure needs. This could be used to help prioritize investments on potential early-integration CAV roadways or corridors.

Existing Conditions	CAV Ready?	Critical Needs
Physical Infrastructure	☐	
Digital communications infrastructure	☐	
Intersection Control Infrastructure	☐	
Curb-Space Infrastructure and Management (ex: parking, loading zones, pick-up/drop-off)	☐	

Data Privacy & Security

See: Data Privacy and Security (Page 32)

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<tr><th>NEAR-TERM RECOMMENDATION</th><th>STEPS TO TAKE ACTION</th><th>IMPLEMENTATION</th></tr>
<tr><td rowspan="6">Follow guidance or industry standards for collecting, storing, and securing CAV data.

Why?
To reduce privacy risks, request only processed and aggregate data to measure success against performance measures and practice good cyber hygiene.

Who?
Transportation and Local IT departments</td><td rowspan="6">☐ Identify performance metrics and data needs.

☐ Identify data that could be useful for private industry (roadway mapping and inventory data, curb usage, and construction zones) and what data the public agency may need from private industry. Use agency data as bargaining chip to collaborate and coordinate data sharing agreements.

☐ Identify agency data and cybersecurity practices.

☐ Ensure agency staff working with data are trained in good data privacy and cyber hygiene practices.

☐ Identify staff member(s) to track guidance and industry standards for CAV data.</td><td>Brainstorm potential performance measures (tied to goals identified earlier) to measure progress. Identify potential data needs and data sources needed for each performance measure:</td></tr>
<tr><td>
<table>
<tr><th>Potential Performance Measures</th><th>Potential Data Needs</th><th>Potential Data Sources</th></tr>
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<tr><td>Is there a data management plan? What updates are necessary to address technology changes?</td></tr>
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NOTES:

Please use this additional space to take notes and collaborate as you work through the User Guide for CAV Planning.