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October 17, 2025

Michael Halem
Principal Deputy Assistant Secretary for Research and Technology
Office of the Assistant Secretary for Research and Technology
U.S. Department of Transportation
1200 New Jersey Avenue SE
Washington, DC 20590-0001

**SUBJECT: Request for Information — Research Ideas To Support
Nationwide Automated Vehicle (AV) Deployment, [Docket No.
DOT-OST-2025-1029]**

Mr. Halem,

On behalf of the National Association of City Transportation Officials (NACTO), I am commenting in response to the U.S Department of Transportation's Request for Information on research ideas to support nationwide automated vehicle (AV) deployment [Docket No. DOT-OST-2025-1029].

Our member cities across the U.S. have proven, real-world experience with AVs operating on city streets. NACTO and our member agencies believe that an autonomous future is centered on people and restoring life to our streets. The rapid innovations in mobility technologies offer many potential benefits, but realizing those positive outcomes requires collaborative relationships between private interests and governments.

Research provides the foundation for a thriving autonomous vehicle industry that guarantees safety and has enduring success in a competitive global market by incentivizing the development and adoption of the best and safest technologies reflective of American innovation and know-how.

NACTO encourages thoughtful policy and regulations that ensure new and improved technologies create a safer transportation system. Our priorities, embodied in our [Principles for Autonomous Vehicles on City Streets](#), reflect the needs of cities in different states and regions across the country.

In response to the RFI, we share recommended research priorities related to AV deployment, including data standards, infrastructure

readiness, and system-wide impacts. We also highlight key challenges and opportunities related to planning, fairness, transparency, and public trust — factors that are essential to ensuring that AV technologies serve the public interest.

We sincerely appreciate the U.S. Department of Transportation's efforts to advance safe, equitable, and innovative mobility solutions through thoughtful research and stakeholder engagement.

The following research areas, organized by the six themes outlined in the RFI, are recommended for further exploration to support safe, equitable, and effective AV integration at the national level.

1. Data Standards and Integration

Robust data-sharing requirements allow state and local governments to access and use data from emerging technology to inform and enforce regulations, laws, programs, and plans. Standardized and comprehensive data collection is essential to evaluate how AVs impact transportation system performance compared to human-driven vehicles. U.S. DOT should prioritize the following data types and research areas:

- *Crash data*: Include by type, severity, involvement of vulnerable road users, and time-to-time collection metrics. Research should also explore whether specific AV behaviors could have altered crash outcomes.
- *Disengagements*: Track instances where the AV system cannot proceed and requires human intervention, whether in person or remotely.
- *Vehicle Miles Traveled (VMT)*: Disaggregate by city, roadway type, and environmental conditions to assess deployment scale and system impacts.
- *Vehicle speed*: Collect speed data to evaluate AV contributions to congestion management and roadway safety.
- *Near misses and other non-collision incidents*: Include events such as AVs blocking emergency vehicles or failing to yield, which may not result in crashes but still pose safety concerns.
- *Time to resolution*: Measure the time it takes for an AV to resolve an issue and resume proper operation after encountering a disruption.
- *Telematics data*: Capture detailed vehicle behavior, including speed, acceleration, steering, lane usage, and swerving.
- *Operation Design Domain (ODD)*: Document the specific conditions under which AVs are designed to operate, including geographic, environmental, and time parameters.
- *Fleet size and maintenance logs*: Track the number of AVs in operation and their maintenance history to assess reliability and operational readiness.
- *Fueling efficiency*: Monitor energy consumption and refueling or recharging patterns to evaluate environmental impacts and operational efficiency.

In addition to these core data types, AVs equipped with new advanced sensors (radar, lidar, AI perception systems) can provide valuable insights into the surrounding environment and infrastructure conditions:

- *Incident detection*: Capture information about incidents occurring near the AV, even if the AV is not directly involved.
- *Infrastructure condition reporting*: Identify issues such as faded striping, damaged curbs, or other maintenance needs, and communicate them to infrastructure owners to support proactive asset management.
- *Modeling rare or extreme events*: Use probability-based methods to prepare for unlikely high-impact scenarios, including setting clear safety limits and planning for rare events that could have serious consequences.
- *Interoperable data systems*: Develop platforms that enable infrastructure owners to share data with all AV companies simultaneously and receive standardized, actionable data in return. This two-way exchange is critical for coordinated system management and safety oversight.

2. Edge Case Characteristics Identification

To fully understand how AVs interact with roadway environments, we must study rare or complex situations – especially in urbanized areas where special events and dynamic conditions often arise. These scenarios may not occur frequently, but can significantly affect AV performance. To ensure data is consistent and usable, the following variables should be clearly defined and labeled:

- *Time of day and natural lighting*: AV behavior may vary during daylight, dusk, or nighttime hours.
- *Weather conditions*: Rain, fog, heat, and other weather factors can influence AV sensor performance and decision-making.
- *Infrastructure and its quality*: The condition and design of roadways, signage, and intersections can affect AV navigation and safety.
- *Traffic patterns*: Account for variations in traffic volume and flow, including peak hours, different seasons and irregular surges.
- *Congestion levels*: Multimodal and urban traffic environments may present unique challenges for AVs, especially in terms of merging, yielding, and lane changes.
- *Curbs, driveways, and ramps*: The presence and design of curbs, driveways, and curb ramps influence AV planning and pedestrian interactions.
- *Pedestrian and bicycle traffic*: AVs must be able to detect and respond appropriately to a variety of people using the street, including those using mobility aids, riding bikes and scooters, skateboarding or rollerskating, or simply walking.
- *Transit traffic*: Study interactions with buses and other transit vehicles, including at stops, in shared conditions, and when operating in dedicated lanes.
- *Pavement quality*: Surface conditions such as potholes, uneven pavement, or construction zones can impact AV performance.

- *Presence of cones, barricades, or human traffic control:* Temporary traffic control measures, especially during events or construction, require AVs to interpret non-standard cues.
- *Rail infrastructure:* Proximity to rail crossings or embedded tracks introduces additional complexity for AV navigation and safety.

3. Supervision Dynamics and Human Interaction

Further research is needed to understand how AVs perceive and respond to human-directed traffic control in various real-world scenarios.

- *Human-directed traffic control:* This includes interactions with a variety of first responders and traffic control staff, including but not limited to:
 - Law enforcement officers, whether on foot or mounted;
 - Construction personnel;
 - Airport ground staff, at departures and arrivals drop off;
 - Crossing guards (e.g., near schools); and
 - Individuals in varying visibility conditions (e.g., with or without high visibility vests).
- *Emergency scene dynamics:* Assess how interactions and communications with AVs impact emergency scenes, resources, and emergency response times.
- *Legal accountability and enforcement:* Explore legal frameworks for holding AV systems accountable for traffic violations, including how citations can be issued and enforced when the operator is a software system.

4. Evidence-Based Evaluation

As AV deployment expands, it is critical to evaluate the long-term impacts of these technologies on the systems in which they operate. Beyond the physical roadway network, this includes emergency response systems and broader mobility infrastructure. Areas for further research include:

- *System-wide impact assessment:* Conduct studies that assess how AVs affect traffic flow, congestion patterns, traffic delay, interaction with first responders, and incident clearance time with metrics including Vehicle Miles Traveled (VMT) and deployment scale.
- *Social awareness limitations:* AVs currently struggle to interpret nonstandard traffic control, such as hand signals from police officers directing traffic. Research should evaluate the current capabilities of AV systems in these scenarios and develop metrics and testing protocols to track improvement over time.

5. Transparency and Public Understanding of AV Impacts on the Transportation System

To foster public trust and support effective planning, transparency around AV operations and their varying impacts on the transportation system must be improved. We recommend research and development related to:

- *Fleet deployment footprint:* Develop a standardized program to track the number of AVs in operation, the companies deploying them, their zones and hours of operation, and fleet coordination systems.
- *Real-time fuel monitoring:* Investigate systems that allow automated fleets to monitor fuel consumption per trip, adjust driving behavior in real time, and predict when and where to refuel.
- *Communication of altered road conditions:* Explore whether AVs can detect and report changes in roadway conditions — such as construction zones or temporary obstructions — to a centralized data hub accessible to other road users and infrastructure owners.
- *Disengagement data:* Collect and analyze the locations and causes of disengagements — instances where the automated driving system hands control back to a human operator. This information can help infrastructure owners identify operational challenges and prioritize improvements.
- *Spatiotemporal analysis and monitoring:* Use space and time data to monitor AV activity patterns and assess their impacts on traffic flow, safety, and infrastructure usage over time.
- *Map accuracy and updates:* Ensure that digital maps used by AVs are updated regularly and reflect real-time conditions. AVs must not rely on static maps because the actual right-of-way is often used in dynamic and varied ways (e.g., temporary lane closures, construction zones, or special events).
- *Energy Infrastructure:* Electricity costs and grid capacity vary greatly from region to region. Research should help understand the energy demand impacts due to the introduction of electric AV services in different geographies and recommend the required capacity and infrastructure projects to support them.
- *Land use impacts due to depot siting:* Residents and their governments need to understand the potential effects related to the siting of AV depots, including any additional VMT generated by their locations and the resources necessary to service and support those depots.
- *Workforce impact:* To date, labor considerations seem non-existent in the discussion for AV commercial service pilots or launches, despite claims that AVs will create jobs. Impartial research to understand estimated job creation and loss will fill that gap. Such research should also recommend mitigation strategies, based on initial findings.

6. Evaluating Consistent Vehicle Behaviors and Interactions with Other Road Users and the Transportation System

To ensure AVs operate safely and predictably in diverse environments, it is essential for any research to evaluate their behavior under a wide range of conditions and interactions. We recommend the following areas for further study:

- *Closed-course testing:* All AV companies should conduct rigorous testing on a closed course to verify that their vehicles can navigate and respond to various scenarios. These tests should include different lighting conditions, road conditions, weather events, and levels of traffic congestion.
- *Performance consistency:* To assess whether AVs operate safely and reliably, key indicators such as disengagements, collisions, and near-miss incidents should be tracked and analyzed over time. These metrics can help determine whether AV systems improve and behave consistently across different environments and situations.

Thank you for the opportunity to contribute to this process. NACTO and its members look forward to conversations with the U.S. DOT about. Should you have any questions, please contact Josh Naramore, Senior Program Manager, Policy, at josh@nacto.org.

Sincerely,



Ryan Russo
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National Association of City Transportation Officials