



March 20, 2026

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

RE: Request for Information—Research to Support Establishing a National Strategy for Transportation Digital Infrastructure [Docket No. DOT-OST-2026-0430]

Dear Principal Deputy Assistant Secretary and Acting Assistant Secretary Halem:

The Alliance for Automotive Innovation (“Auto Innovators”) appreciates the opportunity to provide input to the U.S. Department of Transportation’s Office of the Assistant Secretary for Research and Technology (“OST-R”) on research and development activities needed to modernize the nation’s transportation system through the application of digital infrastructure at scale. We support the development of a holistic strategy that integrates technology and leverages data in a manner that can provide key insights on important departmental goals such as advancing transportation safety, improving mobility, increasing resiliency, and making operations more efficient. In addition, Auto Innovators contends that digital infrastructure can enable the deployment of emerging vehicle technologies like advanced driver assistance systems and conditionally and fully automated vehicles. A coordinated national strategy for the deployment of Transportation Digital Infrastructure (“TDI”) will help promote system interoperability, prevent transportation gaps, create consistent standards, manage transportation assets, and support multimodal operations.

Auto Innovators represents the full automotive industry, including the manufacturers producing most vehicles sold in the U.S., equipment suppliers, battery producers, semiconductor makers, technology companies, and autonomous vehicle developers. Our mission is to work with policymakers to realize a cleaner, safer, and smarter transportation future and to ensure a healthy and competitive automotive industry that supports U.S. economic and national security. Representing over 5 percent of the country’s GDP, responsible for supporting nearly 11 million jobs, and driving almost \$1.5 trillion in annual economic activity, the automotive industry is the nation’s largest manufacturing sector.

TDI and its components (software, hardware, data, communications) constitute core infrastructure that the Federal government should consider to be of strategic importance, and transportation planners should plan to budget, fund, and maintain the digital systems that enhance transportation safety and performance. Benefits such as safer operations, more efficient mobility, continuous innovation, and resilient supply chains warrant significant investment, eligibility for Federal funding, and Departmental prioritization. Utilizing data and real-time information from state and local governments can address safety concerns before problems arise or there is a traffic incident, allowing transportation planners and other stakeholders to take a more proactive approach to safety and system

improvements. In addition, TDI can help overcome disparate data and fragmented systems to develop a more unified, interoperable framework that supports increased transportation safety and efficient mobility across states, regions, and transportation modes.

Auto Innovators respectfully offers the following input to inform the Department's research agenda that supports the development, deployment, and scaling of digital infrastructure nationwide:

- **Define TDI:** "Transportation Digital Infrastructure" should mean "the collective public and private technology assets and systems that generate, exchange, transmit, and process transportation-related data or information to optimize existing and new transportation services." The term includes communications networks, hardware and devices, data systems and platforms, software applications, standards and architectures, cybersecurity and privacy controls, assurance and compliance systems, and data itself.
- **Acknowledge Industry's Ongoing Innovation:** Industry innovation related to TDI continues to advance rapidly. Furthermore, industry-led collaboration adds significant value to TDI deployment because the private sector can often move more quickly and effectively than government-driven processes. Therefore, Auto Innovators maintains that any national TDI strategy should aim to support and coordinate ongoing innovation rather than inadvertently slow progress while the Federal government develops a broader framework.
- **Pursue Intergovernmental Cooperation:** The Administration is pursuing significant lines of effort with respect to artificial intelligence and related research and development, robotics, advanced manufacturing, and TDI. These domains are highly interrelated and interconnected. Therefore, purposeful interagency cooperation would help strengthen national capabilities in these areas, provide for more efficient uses of public resources, accelerate innovation and technological development, improve data sharing, reduce duplicative policy and regulatory burdens, and enable responsible agencies to coordinate on training and education initiatives to upskill and retrain workers.
- **Prioritize TDI Research Needs:** The Department should dedicate resources to research cellular connectivity-related transportation and safety applications (*e.g.*, V2X, Networked V2X). Over 90 percent of new vehicles in the United States have built-in cellular connectivity, so Departmental prioritization in this space can advance high-impact transportation and safety applications.
- **Leverage Existing Projects:** The Department should evaluate existing testbeds, pilots, and demonstrations implemented pursuant to its Strengthening Mobility and Revolutionizing Transportation ("SMART") grants, Advanced Transportation Technologies and Innovation ("ATTAIN") grants, Complete Streets Artificial Intelligence Initiative grants, ITS4US Program sites, other ITS Joint Program Office research projects, Euro NCAP local hazard warning alerts, Responder-to-Vehicle digital alerting, Partnership for Analytics Research in Traffic Safety ("PARTS"), Management of Electronic Traffic Regulations ("METR"), SAE Industry Technologies Consortia® Digital Road Rules Consortium ("DRRC"), the European Data for Road Safety ecosystem architecture, and responses to next-generation Traffic Incident Management self-assessments. The Department should work with other Federal, State, Local, Tribal, Territorial, industry, and academic partners to establish additional testbeds to research

real-world, multimodal approaches to sensor manipulation or spoofing, cross-jurisdictional incident response and privacy regulations, connected and automated vehicle cybersecurity, and positioning, navigation, and timing (“PNT”) needs for automation, and precise positioning with 1 centimeter level accuracy.

- **Standardize Data and Technology Rollouts for New Projects:** The Department should standardize data and technology rollouts to support certain use cases. One example is the use of existing data to develop a National Road/Rail Intersection Blockage Forecast application programming interface to communicate to automated and emergency vehicles when there are blockages of road-rail intersections and for how long within the next 30 minutes. Another is the creation of common standards for sharing crash data from vehicles to call centers and first responders to enhance post-incident management and post-crash care. The lack of such standards limits opportunities to improve the speed and quality of emergency response.
- **Data Normalization:** Data normalization is a key element of TDI system architecture. Leveraging cloud-based systems can provide for foundational data exchanges; standardization of data formatting, syntax, and organizational principles; contextual understanding; and policy, process, and framework alignment to support process integration and secure data sharing across platforms, transportation modes, and connectivity pathways.
- **TDI for Planning, Construction, and Asset Management:** TDI, especially artificial intelligence applications, can process and translate data from infrastructure-based sensors and vehicle operating environments to assist with design, construction, maintenance, and operational processes for transportation infrastructure systems. Smarter information and better sensing can enable Federal operating administrations and state transportation authorities to monitor infrastructure asset performance, a key component to help inform and promote a Safe Systems approach to roadway infrastructure, identify problem areas for updates during planned construction, and support the deployment of advanced vehicle technologies.
- **Federated Data Sharing:** High-quality transportation data is foundational to TDI, and such data comes from various sources including infrastructure owners and operators, automotive companies, and personal mobile devices. However, concerns about privacy, security, data heterogeneity, and data quality can discourage data sharing, and therefore, the Department should investigate federated learning models to account for the velocity, volume, and variety of transportation-generated data and to improve accuracy and robustness in the real-time collection, processing, and analysis of such data for better efficiency and responsiveness in transportation systems. The Department should also evaluate how best to ensure transparency in transportation data collection efforts, with clear disclosures related to identifying the specific data collected, specifying the retention periods for such data, and disclosing any data-sharing partners.
- **Existing Architecture Frameworks and Standards for TDI:** In addition to the Department’s Architecture Reference for Cooperative and Intelligent Transportation (“ARC-IT”), the Department could consider FHWA’s next-generation Traffic Incident Management program; the International Organization of Standardization/International Electrotechnical Commission/Institute of Electrical and Electronics Engineers Standards Association 42010 standard; the European FRAME Architecture; and The Open Group Architecture Framework and

related Architecture Development Method to underpin TDI development and deployment. Other topic-specific standards related to connectivity, data and interoperability, cybersecurity, and cloud operations can support TDI as well.

- **Latency and Throughput Requirements:** Latency and throughput requirements for safety-critical functions like V2X communications, automated driving systems, and cooperative driving automation vary significantly depending on the use case, and therefore, the Department should study such requirements based on a particular use case's characteristics. In the context of V2X communications, the Department should study packet loss and cybersecurity processing time that causes latency and throughput constraints.
- **Prioritization of Research Gaps and Challenges:** The Department should prioritize research regarding any gaps and challenges related to the use of commercial cellular connectivity for automotive safety applications across operating administrations. The Department should also focus on how TDI can help establish a national crash-to-outcome feedback system, where a vehicle triggers an automatic or advanced automatic crash notification, the subsequent chain of first responder response, emergency response dispatch, on-scene triage, hospital care, and patient outcome should be linked and anonymized in a single national repository. In addition, the Department should consider how existing camera and sensor networks can provide insights into incidents and near-miss-level incidents to address vulnerable road users.
- **Artificial Intelligence Support for TDI Development and Deployment:** Artificial intelligence applications, such as machine/deep/reinforcement learning, computer vision, sensor data fusion, risk prediction, and method validation, should help support TDI development and deployment through demand forecasting, scenario modeling, transport network simulations with digital twins, signalized intersection timing adjustments, resilience planning, congestion reduction, incident detection, emergency response, predictive roadway maintenance, and construction optimization.
- **TDI and Technology Acceleration:** TDI can help accelerate the development, deployment, and viability of advanced transportation technologies. For example, all road users, regardless of vehicle technology or automation level, will benefit from consistent and well-maintained lane markings, signage, and traffic control devices that TDI can facilitate and incorporate. The Department should work with State, Local, Tribal, and Territorial partners to expand the network of publicly owned Traffic Management Centers with data-sharing agreements and necessary operational clearances. Such efforts can help enable transportation planners to use computer vision and deep learning to process images for lane, sign, and device detection and classification in real-time, applications that can help improve overall roadway safety. Integrating V2X communications, roadside units, edge computing, sensors, and other technologies in roadway infrastructure can enhance situational and cooperative awareness, and such infrastructure can function as a sensor itself, monitoring and communicating structural changes and environmental conditions.
- **Ensuring Trust, Accountability, and Privacy:** Transportation planners should adopt zero trust architecture principles across TDI components, including continuous authentication and authorization, micro-segmentation around safety-critical domains, end-to-end encryption of

sensor telemetry data, constant network monitoring, and real-time anomaly detection and automated response. Other principles, controls, and measures to ensure trust, accountability, and privacy include security-by-design, privacy enhancing techniques, role-specific and attribute-based access controls, secure development lifecycle approaches, and quantum-resistant cryptography.

- **Securing Data Exchanges:** The Department should adopt federated data-sharing architectures, with standardized, cryptographically signed Application Programming Interfaces (“APIs”); federated identity management across different jurisdictions; policy-defined data contracts with machine-readable metadata; and data access audits. In addition, the Department should establish a National Transportation Data Trust as a neutral governance model for multimodal data exchanges, enforce cybersecurity and privacy requirements, certify vendor compliance with appropriate standards, and support secure public-private innovation. Other guidance documents that should inform secure data exchanges include the Federal Data Strategy and related Action Plans; the Cybersecurity Framework 2.0, the Privacy Framework 1.1, and the Artificial Intelligence Risk Management Framework from the National Institute of Standards and Technology (“NIST”); and binding operational and emergency directives from the Cybersecurity and Infrastructure Security Agency.
- **Threat Vectors:** Significant threat vectors introduced by extensive transportation system sensing and data integration go beyond traditional Information Technology- and Operational Technology-related threats. Sensor manipulation and spoofing can impact automated driving and cooperative driving automation systems, while compromised datasets and data poisoning can manipulate artificial intelligence models, distort multimodal routing, reduce traffic prediction, and influence automated driving system decision-making. Supply chain security, data exfiltration and injection, and data tampering are concerns, particularly since the transportation ecosystem relies upon high-risk firmware or hardware in its cyber-physical systems and Internet of Things components. Collecting telemetry data across modes could result in new high-value espionage and ransomware targets, while breaches can cascade across modes if there are integrated data exchanges or if TDI architecture lacks controls or sufficient segmentation. And there are tampering risks for physical infrastructure like roadside units.
- **Collaboration with NIST:** The Department should partner with the NIST National Cybersecurity Center of Excellence to develop TDI-related community profiles in accordance with the Cybersecurity Framework 2.0. It should also collaborate with NIST to investigate how the Data Governance and Management profile that leverages the Cybersecurity Framework 2.0, Privacy Framework 1.1, and the Artificial Intelligence Risk Management Framework can apply to TDI. Any previous guidance or existing work on cyber-physical systems, connected and automated vehicle cybersecurity, cybersecurity standards for APIs and data sharing, and integration strategies for operational technology should inform such community profiles.
- **Incorporation of Legacy and Proprietary Data:** Transportation planners should deploy protocol converters to translate communication rules from one format to another and to convert data; virtualize and secure legacy operational technology components; and harden interfaces with encryption and the principle of least-privilege access to facilitate the incorporation of legacy and proprietary data into a new national data exchange. Digitized state traffic rules in a centralized

location would enable industry and government stakeholders to have a common trusted source to ingest the rules. To support TDI development or deployment, third-party vendors should provide software and hardware bills of materials, demonstrate operational alignment with the NIST Cybersecurity Framework 2.0, comply with zero trust architecture requirements, and support standardized, open APIs.

Auto Innovators welcomes the Department's solicitation of public and stakeholder input to inform a coordinated national strategy for the development and deployment of Transportation Digital Infrastructure. TDI can help accelerate the commercialization of advanced vehicle technologies, which contributes to the global competitiveness of the U.S. automotive industry. Transforming current transportation systems into data-driven, intelligent mobility ecosystems can help improve transportation safety, detect road hazards in real-time, optimize traffic and reduce congestion, lower freight costs, and increase asset lifecycles, among other benefits. We look forward to continued engagement with the Department as it develops a coordinated national strategy on the development and deployment of TDI.

Sincerely,

A handwritten signature in cursive script that reads "Tara Hairston". The signature is written in a dark ink and is positioned above the printed name and title.

Tara Hairston
Senior Director, Technology Policy