



July 2, 2024

Dr. Firas Ibrahim
Director
Office of Research, Development and Technology
Office of the Assistant Secretary for Research and Technology
US Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

RE: Opportunities and Challenges of Artificial Intelligence (AI) in Transportation; Request for Information; Docket No. DOT-OST-2024-0049.

Dear Director Ibrahim:

On behalf of the American Road & Transportation Builders Association (ARTBA) and our more than 8,000 public and private sector members from the transportation construction industry, we respectfully offer the following comments regarding the US Department of Transportation's (DOT) Request for Information on the use of artificial intelligence (AI) in transportation.¹ Many of our members have been leading the conversation on various uses for AI technology in transportation. We welcome the opportunity to summarize their thoughts here and hope that DOT will continue this dialogue as opportunities arise.

Background

ARTBA's membership encompasses a diverse array of practitioners within the transportation construction industry. This includes contractors, planning and design firms, consultants, state and local transportation agencies and officials, developers, research institutions, materials suppliers, and equipment manufacturers. Together, our members plan, design, build and maintain essential infrastructure assets across all transportation modes.

Committed to safety, environmental stewardship, and the timely and cost-effective delivery of projects, our members work to maximize the value of historic funding from the Infrastructure Investment and Jobs Act (IIJA). They also continually seek innovative ways to achieve these objectives, including with new and emerging AI technologies.

¹ Opportunities and Challenges of Artificial Intelligence (AI) in Transportation; Request for Information, 89 Fed. Reg. 36848, (May 3, 2024).

Comments on the Request for Information

I. AI has the potential to significantly enhance both project delivery and safety.

Many state departments of transportation and private companies are already effectively utilizing AI technologies. For example, AI is being used to analyze traffic patterns, coordinate incident response, enhance congestion mitigation, and more. Additionally, AI is being applied at the planning and design stages of major projects. One such example is the use of light detection and ranging (LiDAR) technology to map data points along a project route, assisting in identifying and categorizing various assets, including vegetation and utility infrastructure.²

Future AI capabilities hold significant potential to further enhance roadway safety. Some potential applications include:

1. Enhanced traffic management using real-time traffic data.
2. Projecting time frames for maintenance and repairs of transportation infrastructure assets.
3. Analyzing driving patterns and driver behavior to suggest accident prevention measures.
4. Identifying high-risk areas to target for infrastructure improvements and/or safety enhancements.
5. Identifying load bearing limits for bridge assets and linking this information to permitting for trucks, as well as permissible loads due to deterioration.

II. Certain challenges must be addressed to fully optimize AI's potential.

- A. *DOT should establish reasonable baseline standards that can serve as a launchpad for future technologies.*

Implementing a set of foundational standards is essential to harnessing the full potential of AI in transportation. As AI applications become increasingly integral in disciplines such as roadway design, environmental planning, and safety assessments, the absence of standardized processes and data quality measures can lead to inconsistencies and inefficiencies throughout different stages of infrastructure project development. Additionally, many individuals utilizing AI technologies are licensed professionals, and currently, there are no standards outlining the liabilities they assume when using these technologies.

ARTBA members have therefore recommended that DOT develop a set of baseline standards to ensure consistency and reliability in data handling and project execution. These standards

² See Jim Hanson & Pedram Oskouie, *Unlocking the Promise of AI in Transportation*, Am. Rd. & Transp. Builders Ass'n Transp. Builder Mag., Mar.-Apr. 2024. See also, Kishan Patel, *Why AI is Essential to the Future of Heavy Construction*, Am. Rd. & Transp. Builders Ass'n Transp. Builder Mag., Mar.-Apr. 2024.

should encompass – but are not limited to – data collection methodologies, data formats, and interoperability requirements to ensure seamless integration across various AI platforms and tools. Rather than developing standards from scratch, we recommend that DOT leverage those of the International Organization for Standardization (ISO) and others.³

By standardizing these processes, DOT can facilitate more accurate and reliable data analysis, leading to better-informed decision-making and more effective project outcomes. This standardization will not only enhance operational efficiencies, but also facilitate regulatory and legal compliance, ensuring that AI implementations adhere to industry best practices and government regulations. Moreover, establishing these standards will help unlock the vast data reservoirs that transportation agencies possess, enabling more sophisticated data analytics, optimizing design processes, and automating routine tasks such as maintenance scheduling and traffic management. This, in turn, will drive innovation, improve safety, and ensure the sustainability of transportation infrastructure.

B. DOT cannot overlook issues of data privacy and cybersecurity.

Another challenge with using AI in transportation is ensuring data privacy and security. Implementing AI systems involves collecting and analyzing vast amounts of information from various sources. It is crucial to protect the privacy and security of this data to prevent unauthorized access, data breaches, and misuse of sensitive information. Safeguarding this data while maintaining its integrity for accurate AI analysis poses a significant challenge, impacting not only roadway users but also those in transportation construction who rely on it for planning, building, and maintenance activities.

Enhanced cybersecurity measures are essential to effectively addressing these concerns. This includes implementing advanced encryption techniques, secure data storage solutions, and stringent access controls to protect sensitive information. Additionally, developing comprehensive privacy policies that outline the acceptable use, sharing, and retention of data can help build public trust and ensure compliance with legal requirements. By prioritizing data privacy and security, transportation agencies can mitigate risks and create a secure environment for the deployment of AI technologies, ultimately enhancing the overall safety and efficiency of transportation systems.

Conclusion

ARTBA appreciates the opportunity to provide comments on the potential and challenges of integrating AI into the transportation sector. Our members remain at the forefront of utilizing AI technologies to improve traffic management, enhance safety, and streamline project delivery. However, for AI to reach its full potential, it is imperative that DOT establish baseline

³ See e.g., ISO 19650 – Information management using building information modeling (BIM) (Int’l Org. for Standardization 2018). See also, ISO 16739 – Industry Foundation Classes (Int’l Org. for Standardization 2013). See also, ISO 29481 – Information Delivery Manual (Int’l Org. for Standardization 2016). See also, EN 17412-1 – BIM-Level of Information Need (European Standard 2020).

standards and address critical issues related to data privacy and cybersecurity. These steps will ensure consistency, reliability, and security in AI applications, thereby driving innovation and improving the safety and efficiency of our nation's transportation infrastructure.

We encourage you to read our members' individual comments and look forward to continued collaboration with DOT to explore and implement AI-driven solutions that will advance the transportation construction industry. For further questions or additional information, please feel free to contact Prianka Sharma at psharma@artba.org. Thank you for considering these comments.

Sincerely,

/s/

Prianka P. Sharma

Vice President and Counsel for Regulatory Affairs

American Road & Transportation Builders Association

Unlocking the Promise of AI in Transportation

Artificial intelligence (AI) and big data are revolutionizing our understanding of transportation systems, empowering leaders to make better informed decisions than ever before. The growth of AI is also providing new efficiencies for project teams by undertaking tedious tasks previously either done manually or not at all.

Over the past decade, new data sources have dramatically increased available information, opening the potential for transportation engineers and planners to better plan, design, operate, manage and maintain transportation infrastructure and systems. However, because of the sheer volume of data, transportation professionals have struggled to extract meaningful insights. Now, the added tool of AI can be used to efficiently process this tremendous amount of information and gain meaningful insights in a timely manner.

Artificial intelligence has already begun to unlock the potential of data by enabling insights previously too labor-intensive or complex to achieve cost-effectively. This holds great promise for improving how transportation projects are designed, constructed, maintained and used, with benefits for project management, construction safety, traffic management, parking solutions, infrastructure maintenance and more.

How Are These New Capabilities Being Applied?

We're already seeing examples of how AI and data are leading to more proactive transportation decisions. Google Green Light applies AI and crowd-sourced data from Google Maps to model signal operations and provide recommendations to optimize traffic flow. Similarly, Axilion X Way uses AI to assess traffic data and provide recommendations to optimize signal operations based on user-selected priorities. And Rekor Command assesses multiple real-time data feeds using AI to enhance traffic management and incident response.

These capabilities are being tested and rolled out across the country. Multiple states are improving their traffic management by using cloud-based software to process



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feeds from CCTV cameras and identify incidents, or to reduce congestion. This applies to work zones and established roads.

One state department of transportation, for instance, is using AI and machine learning to predict traffic flow through construction areas and investigating how to prepare work zones for connected and automated vehicles. Owners are also using AI and computer vision in conjunction with inspections to monitor the condition of their assets and predict what maintenance is needed by analyzing images and videos from IoT sensors, cameras and edge devices.

The new capabilities also hold promise for projects still in design and construction. Major design software offerings such as Autodesk and Bentley are introducing AI integrations to improve their workflows, particularly in the management of digital twins. Powerful machine learning processes are helping detect assets from LiDAR data.

For example, on the 10-mile Ontario Line subway project through downtown Toronto, we used LiDAR to collect more than 15 billion data points aboveground and underground. This data was then processed to automatically detect and isolate asset classes such as vegetation and powerlines.

On a massive project such as the Ontario Line, AI is also used to improve efficiency in communication. There are more than 900 design models on the project and thousands of staff who have been involved in some way. A natural language modeling-based AI chatbot powered by large language models provided an efficient way to access information about the project.

Rather than send emails back and forth, a cognitive AI bot can answer questions such as, "Where can I find an

updated org chart?” or “What’s our contract scope on segment 4?” or even “How do I create a pipe network from imported GIS data?” Over the course of the project, the bot is expected to eliminate thousands of hours of manual and repetitive emails, chats and phone calls by providing information quicker and easier.

How Should the Industry Respond?

- 1. Keep your eye on the goal.** Companies and solutions are popping up everywhere to solve every conceivable problem. While AI holds tremendous promise, it is important to identify the outcome you’re hoping to achieve and prioritize that. Will the AI-based solutions proposed or considered make a meaningful contribution to achieving that benefit?
- 2. Start with better data.** To result in the best insights, AI must have access to the right data. While there are many cloud-based data sources available, they all have limitations. Supplementing this data with traditional data sources such as detector-based data can result in better insights. Once data is gathered, accurate and meaningful AI-driven analytics also requires standard formatting. This formatting, combined with sharing public data through a standard exchange, will make it much easier for actionable insights to be generated.
- 3. Rethink how data is obtained and analyzed.** Traditionally, it has been the practice for organizations to collect, own and analyze their own data. New big data sources, easy access to the cloud, and various entities developing AI applications

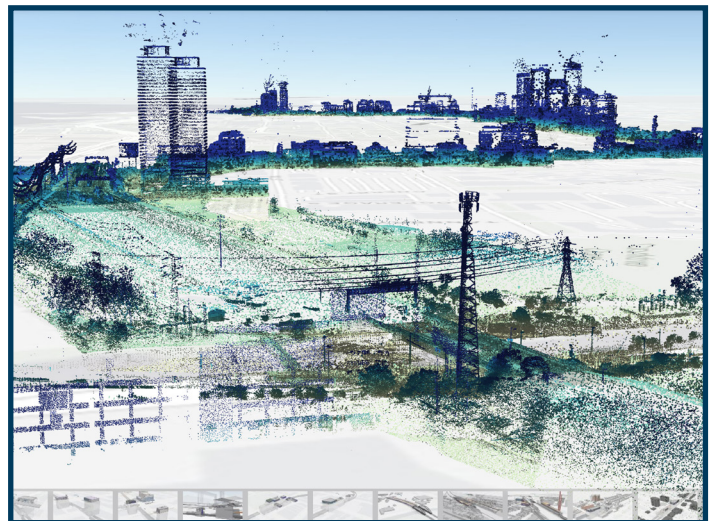
to analyze the data are resulting in changes to how information and insights are accessed. Organizations will have to rethink practices for obtaining data to capitalize on opportunities with third parties. At the same time, standards for those aggregating and analyzing data will need to be in place to ensure quality, as their outputs are increasingly relied upon to operate and maintain critical infrastructure.

- 4. Develop new job responsibilities.** AI demands a new skillset for employees to get meaningful results. Staff will need to be trained on how to prompt AI systems to get relevant responses, or new hires specialized in these skills will be needed. It will also be important for technical staff to review AI-generated responses with prompts and their teams to make sure responses are accurate and to determine if and how they should be included in projects.
- 5. Maintain flexibility and adaptability.** In the rapidly evolving landscape of AI and big data, the industry must cultivate a mindset of agility and continuous evolution. Design your data architectures, collection methodologies, processing frameworks and AI-based solutions with adaptability at the forefront. Prioritize modularity, open standards and scalable systems that enable seamless integration of new technologies or workflow adjustments. This forward-thinking approach will prevent technological stagnation and empower enterprises to capitalize on emerging opportunities.

See *Promise*, 26



The 10-mile Ontario Line subway project through downtown Toronto. Photo courtesy of HDR.



LiDAR was used to collect more than 15 billion data points aboveground and underground for the Ontario Line project. Photo courtesy of HDR.



Promise, from 25

The integration of AI and big data presents a transformative opportunity for the transportation sector, but navigating this landscape requires a strategic and forward-thinking approach. Enterprises need to prioritize solutions that directly drive value and efficiency in design, construction and operation, recognizing that AI's true power lies in delivering tangible benefits.

Investing in historical data warehousing, new data collection, cleansing, standardization and collaborative sharing practices is essential, as high-quality data remains the bedrock upon which meaningful insights, secure systems and reliable information are built. Embracing flexibility and agility by designing adaptable data architectures and systems is key. This empowers enterprises to seamlessly integrate emerging technologies and capitalize on new efficiencies without falling prey to technological stagnation.

Lastly, adopting a proactive stance on regulatory compliance and ethical considerations in AI applications is crucial. As AI becomes more integral to design and construction in transportation, staying ahead of legal frameworks and ethical guidelines ensures not only adherence to regulations but also builds trust with public communities and stakeholders. The coming decade promises to reshape the way we design, build and operate transportation systems.

By exploring the potential of AI with enthusiasm while investing judiciously and cautiously, and prioritizing these aspects, the transportation industry can fully unlock the power of AI and big data, driving significant improvements in efficiency, safety and travelers' satisfaction.

Jim Hanson is a senior transportation technology lead for HDR, focused on smart mobility, data and automated vehicles. Pedram Oskouie is HDR's digital delivery AI services lead, working on automation efforts in data acquisition, digital delivery and construction.

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Why AI is Essential to the Future of Heavy Construction



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One of the brightest minds in history, Albert Einstein, was famously questioned about how many feet are in a mile. His reply was, “I don’t know, why should I fill my brain with facts I can find in two minutes in any standard reference book?”

Much of what humans perceive intelligence to be is the memorization of facts. Similarly, whenever you meet people who come across as incredibly sharp, this is usually due to their quick-witted nature and ability to recall information without delay.

This is an exciting time to be alive, with so much info constantly being thrown in our direction that it can be difficult to shift gears and recall certain details at the drop of a hat. This is where artificial intelligence (AI) has the potential to enhance our abilities rather than replace them.

Improving Day-to-Day Operations in the Office and the Field

As AI revolutionizes industries worldwide, the construction sector is certainly not an exception. This isn’t just a one-size-fits-all tool to pick up and apply the same way to any industry. AI programs can and should be unique, even built specifically for construction with its exact users in mind.

From preconstruction through the completion of jobs, the help of AI in construction can enable any company with tools to plan and manage workloads more efficiently. For example, AI-powered technology can analyze vast amounts of data in an instant—and that includes both historical production data as well as data generated in real time. This results in accurately projecting timelines, identifying potential risks, and recommending strategies to optimize what you are working on.

Everyone in construction knows the extent to which details are more important than ever. If you’ve won bids by narrow margins, you’re aware of how competitive the construction landscape is—and it will only get more competitive. Additionally, challenges like workforce shortages, supply chain issues, and skyrocketing

material prices are forcing everyone to go back to the drawing board and figure out how to do more with less. Fortunately, the recent advent of AI technology is perfectly poised to help alleviate some of these challenges in the industry.

Nix Risk, Control Costs, and Predict Problems

This old mantra often rings true: while consumers pay to fix problems, businesses pay to prevent those same problems before they even happen. AI-driven maintenance systems for equipment and machinery can utilize all of that real-time data to predict potential failures before they ever occur. This is an unprecedented way of preventing costly downtime, unplanned repairs, and last-minute equipment rentals that can easily blow budgets.

Another massive benefit of AI could be a drastic reduction of accidents and near-misses, boosting the overall safety of companies that adopt this technology. The power of automation looks to identify systemic safety hazards and suggest corrective measures that help workers do their jobs smarter, cultivating safer jobsites.

The solution of AI is so simple that it’s understandable how this game-changer can feel too good to be true. Much like a brain operating at 100 percent where every shred of information is perfectly accessible, AI can interpret past performance, market conditions, and regulatory requirements. What better way is there to help assess and mitigate the numerous risks faced every day of the year?

At the 2024 HCSS Users Group Meeting, the VP for Johannesen Construction, Shane Webley, shared his thoughts on the technology. Keep in mind, he is an expert in utilizing construction software after benefitting from the HCSS platform for over 20 years.

See *Future*, 30



Future, from 28

“We have to continue to look to what's the next thing that's going to continue to set us apart with our company and technology,” Webley commented, echoing how so many successful construction professionals feel today. “I do see the opportunity for some great value there and continue to keep overhead lean and be able to be more effective and efficient as well at our jobs. And so I'm optimistic about its utilization and I think that we'll definitely be looking into how that could be an asset to us.”

The First AI Software to Hit the Construction Industry

Since HCSS has never lost sight of its mission to be a leader in technological innovation, 2024 marks the launch of a new powerful AI tool that no one else in the industry has yet to offer. Just take a second to imagine your own virtual assistant that can comprehend context, detect intent, answer queries effectively, analyze data rapidly, and offer insights—all instantly.

You are picturing an assistant that can automate repetitive tasks so you can focus on complex and value-added work instead. This tool is already fully familiar with the intricacies of heavy construction and can help put an end to uncertainty and reduce the likelihood of

delays and disputes. Better yet, the software provider is SOC 2 compliant, adhering to strict security and privacy standards to give every customer peace of mind regarding their data protection and privacy.

What you are picturing is known as HCSS Copilot.

“HCSS has always been a pioneer of new, cutting-edge tools, and HCSS Copilot is the latest to carry that torch of innovation,” commented Steve McGough, the company's president and CEO. “Built with confidentiality at the forefront, HCSS Copilot will harness large amounts of data to reveal insightful information no other construction software on the market can match.”

In the past, what took you hours and days can now take you mere seconds.

“This next-gen AI technology will help transform your business,” continued McGough. “There is enormous potential that will only be improving from here on out. Many customers are already reaping the benefits of HCSS Copilot and we're excited to be pushing the limits of what is possible in this industry.”

After successful beta testing with select customers, HCSS Copilot was rolled out in February 2024 as part of HCSS Chats. Hundreds of construction companies on the HCSS platform are now leveraging this powerful program daily.

“We want the information at the users' fingertips,” said HCSS Product Portfolio Manager Adam Black. “No more looking for it. It should be instantly accessible just by asking for it. The best part is that this is only the beginning. We'll be expanding HCSS Copilot further this year to include intelligent predictive analysis and task automation.”

The value of AI in construction is undeniable. Construction companies can improve project planning and management, optimize resource allocation, enhance safety and quality control, and sit in the driver's seat of innovation in construction.

The possibilities for transformation and growth are limitless, and the power is now in our hands. It's time to embrace the future and unlock the full potential of AI. Are you in?

Kishan Patel is vice president of product at HCSS.

