RFP#	Title	The problem needing solution	Desired deliverable?	Special Requirements
RFP#01	The Influence of Rubber Modified Asphalt on Pavements Performance	Pavement cracks, either functional or structural, are mostly dependent on the tensile stress of the layer. Rubber-Modified Asphalts (RMA) are known to have great tensile stress properties, improving performance and sustainability of pavements, especially for cracks. Pavements in Maryland are usually affected by different kinds of cracking distresses: functional and structural. Given the different seasonal variations in temperature throughout the state, pavements have developed related functional distresses such as block cracking. Existing asphalt over concrete pavements also develop distresses related to the reflection of joints from existing slabs beneath the asphalt layer. The severity level of these distresses can worsen in a short period of time, depending on the tensile properties of asphalt surface. Existing and potential loads on asphalt pavements have led to structural distresses such as fatigue cracking. Structural distress initiates where the tensile stress is the highest, usually from bottom to up. However, in thick pavements, the cracks can initiate from the top in areas of high localized tensile stresses resulting from tire-pavement interaction and asphalt surface. Both functional and structural cracking distresses are dependent on the tensile properties of the asphalt layer. RMA could increase the tensile properties on asphalt mixes, thereby improving performance and sustainability. In addition, the amount and frequency of pavement maintenance could also be reduced by using RMA on surface rehabilitations and treatments. Improving pavement performance would reduce the required maintenance to keep pavement in good condition and increase sustainability. Maryland House Bill 781 introduced in 2024 proposed mandating the use of RMA in the construction, reconstruction, and repair of State highways. While this bill did not become law, it spotlights the urgent need to appropriately consider the use of rubber modified asphalt. SHA expects this research to lead to a quantified performance of RMA in the field which will guide a better comparison of RMA with the actual practices of both unmodified and polymer modified asphalt layers. It will focus on measuring the performance of asphalt surfaces using RMA on dense-graded and/or gap-graded mixes. The results may also be included into pavement design procedures. The obtained data will be used to optimize pavement rehabilitation and maintenance at a network and project level. This research also needs to be taylored to specifically address using rubber from recycled tires.	The desired deliverables from this research include: - A detailed decription/specification for measuring the performance (e.g. - ride, cracking, rutting, and friction characteristics) of asphalt surfaces using RMA, specifically created from recycled tires, on dense-graded and gap-graded mixes. - A list of recommendations on ways to include the research results in pavement design procedures. - A final report and 2-page summary that describes the detailed methodology used to evaluate and validate the draft specification for RMA and the documented piloted field test results. The discussion of the field test results should elaborate on the ease of constructability and cost-effectiveness of the use of this product.	
RFP#02	Designing the Low Carbon Asphalt Mixtures and Monitor Performance in the Field	Maryland's road network, primarily composed of asphalt, faces challenges in reducing high greenhouse gas (GHG) emissions associated with current practices. Addressing this issue is crucial to meet environmental goals and reduce global climate impact. It is necessary to explore low-emission materials and methods. Utilizing high content of Reclaimed Asphalt Pavement (RAP) could lower GHG emissions but raises concerns about the pavement's performance and durability. MDOT's transition to sustainable asphalt technologies is affected by insufficient data on their long-term performance and environmental benefits. Robust research and trials are needed to validate these technologies before widespread implementation. The SHA's participation in the FHWA's Climate Challenge Program aligns with federal sustainability efforts and enhances Maryland's leadership in eco-friendly transportation. Implementing sustainable practices in pavement management requires a strategic framework to balance environmental compliance, performance, and budgeting. Developing such a framework will support MDOT in achieving its sustainability goals efficiently and effectively across its operations. The proposed study has the following objectives: 1. Evaluate High RAP Content in Asphalt Mixes. Expected Outcome: Comprehensive data on the performance and durability of high RAP asphalt mixes. Benefits: Allows for sustainable material use without compromising road quality, reduces waste and resource consumption. Implementation: Conduct controlled field trials comparing high RAP content mixes with traditional mixes. The possibility using rejuvenators will be studied for reducing the stiffness. 2. Gather Data on Sustainable Asphalt Technologies. Expected Outcome: Detailed performance metrics and environmental impact assessments of new asphalt technologies. Benefits: Informed decision-making on technology adoption, potential for policy development supporting sustainable practices. Implementation: Partner with academic institutions and industry experts to test and monitor various sustainable technologies. 3. Align Practices with FHWA's Climate Challenge Program. Expected Outcome: Strategic initiatives that demonstrably reduce GHG emissions in pavement management. Benefits: Positions Maryland as a leader in sustainable transportation, potential for federal support and recognition. Implementation: Develop a roadmap for integrating climate-friendly practices, with milestones and performance metrics. 4. Create a Strategic Framework for Sustainable Practices. Expected Outcome: A comprehensive framework that guides all levels of pavement management in integrating sustainability. Benefits: Streamlined decision-making, better resource management, achievement of environmental compliance goals. Implementation: Assemble a task force of experts to draft the framework, followed by pilot testing and phased implementation across MDOT operations.	The desired results of this project will be two-fold. First, SHA will need a final report and 2-page summary describing how this research could lead to a measurable decrease in greenhouse gas emissions per ton of asphalt produced, by aligning with environmental targets and potentially qualifying for environmental credits or incentives: (1) recommending practical strategies to implement reduction in GHG Emissions; (2) recommending implementable strategies to increase pavement lifespan identifying/creating a specification for integrating high RAP content and new technologies effectively, while reducing the frequency and cost of repairs. Secondly, SHA would like to develop a marketing plan to share our commitment to sustainabilty through this initiative which (1) strengthens its public image and position as a leader in green infrastructure; and (2) shares our innovative practices and demonstrated effective management to increase trust and support from the public, policymakers and industry partners.	

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RFP#03	**Virtual Weigh System (VWS) Current State of Practice and Technology**	The proposed research is to identify the challenges and current state of Virtual Weigh System (VWS) in Maryland and draft a roadmap and strategies to get Maryland be among the leaders nationwide, if not already. The research team is expective to help identify existing VWS locations to be retrofitted for screening advantages, using criteia such as effectiveness, location, hardware technology, software, comparing other DOTs, compare virtual/digital WS. Recommendations on technology readiness and provide Motor Carrier Division a good understanding on the gap between current VWS practices in Maryland and the state-of-the-art practices across the nation. This research will help identify innovative practices that can then be a part of our VWS program.	1.An integrated mapping of existing VWS systems, including operational effectiveness, type of hardware, software technology and location. 2.A final report and 2-page summary which documents other DOT best practices as compared to MD's current practice and explores innovative practices and technologies MD can implement into our current system. 3.Recommendations on how to retrofit current VWS with advanced technologies such as Hazmat readers and optimization to better screen advantages and screening allocation.	
RFP#04	**Establish an Administration-Wide Data Science Program at SHA**	SHA is data rich but does not centrally store, preserve, or analyze quantitatively much of this data. Generally, data sits in silos never leaving office boundaries, limiting data driven decision making to at best benefit a single office. There is no current forum in place to discuss and identify data across SHA that could be used in data science efforts. Identifying data science efforts has been very localized and without any oversight or prioritization organization wide. AI/Machine learning efforts are complex and costly, requiring the use of advanced software, hardware as well as trained professionals. For these reasons, a centralized effort should prove to be most cost effective. Types of projects that could emerge might include the prioritization of asset management through machine learning or increasing safety by evaluating accident data in combination with a host of other datasets in other offices. For these reasons, it seems logical to identify potential AI/Machine learning use cases across the organization and prioritize these efforts. OIT possesses cloud-based software tools as well as skilled resources to move forward with AI and machine learning efforts and is confident many use cases exist. However, OIT lacks a wholistic prioritized list of potential efforts, along with their associated internal customers, problem statements, and expected benefits to measure success. The research task is expected to support OIT's following effort to establish this data science program: - Document key datasets that would yield themselves well to machine learning efforts across the organization. Examples might include sensor data or ARAN vehicle imagery. - Brainstorm potential data science use cases based on the identified datasets and business objectives. Consider use cases that have the potential to deliver significant value or impact to the organization. - Clearly define objectives including problem statements and intended goals of at least five potential use cases. - Assemble a sub task force/cross-functional team comprising IT data scientists, data engineers/architects, domain experts, and business stakeholders. - Collaborate with IT resources as the data needed is captured into cloud storage. - Prepare the selected dataset(s) for analysis by working with IT on cleaning, preprocessing, and transforming the data. - Work with IT to develop machine learning models to analyze the prepared data and extract actionable insights. Experiment with different modeling techniques and iterate until satisfactory results are achieved. - Validate the output of the models to ensure new data meets expected results. - Along with IT, deploy the validated models into production environments, integrating it with existing systems or workflows where applicable. - Document the process utilized so it can be followed with future datasets and internal business customers.	The selected PI will work with OIT to identify/establish a taskforce comprised of the appropriate individuals that can identify potentially valuable data assets in their respective offices before the research project begins. Through meeting with each office, the research team should deliver the following: - Document key datasets that would yield themselves well to machine learning and identify use cases and associated problem statements for each dataset. - Phase one deliverable should be a list of internal datasets with: Data type/format, Data source location, Update frequency, Associated datasets, Expected benefits, Identified use cases and problem statements. - A report that shares Best Practices from comparable DOTs for data capture of datasets, use cases, and software tools. - An Implementation Plan to identify, capture, and process SHA data into cloud resources.	OIT requires the assistance of a senior data scientist, who will, in collaboration with OIT, define how datasets across the offices can come together for larger enterprise data science use cases.
RFP#05	**Traveler Information for Rural Maryland**	Disseminating traveler information in rural Maryland has long been challenging due to the limited deployment of Intelligent Transportation System (ITS) devices, such as dynamic message signs (DMS) and highway advisory radios (HARs). This challenge becomes particularly acute during major events, such as hurricanes or large-scale evacuations, when clear and accessible communication is critical. HARs, which operate on AM radio frequencies, have been a key tool for disseminating detailed information, but their reliance on outdated technology has made maintenance costly and increasingly unfeasible as spare parts become unavailable. MDOT SHA has already retired half of its HARs and faces difficulty maintaining the remaining units, which are still vital in certain areas.	Recognizing the need for modernization, this research aims to evaluate national practices and identify alternative technologies to enhance traveler communication during natural disasters or other emergencies. By exploring innovative solutions and piloting new tools where HARs and DMS are currently used, this project seeks to improve information dissemination and ensure more effective traffic management in critical situations.	Seeking short synthesis first before commitment to next steps. Phased approach for this project will be completed and accepted before approval for work on additional phases.
RFP#06	**Assessment of Litter Hot Spot Areas for Targeted Reduction in Prince George's County**	The frequency and volume of litter and illegal dumping on state and county roadways in Prince George's County are increasing, despite efforts like scheduled litter blitzes, which have shown limited long-term success. Over the past five years, MDOT DHA spent approximately $42 million removing litter and debris, with last year's costs alone reaching $15 million—the equivalent of 45 new dump trucks or nearly 60 miles of resurfaced roads (Source WBAL News: https://www.msn.com/en-us/news/us/drivers-watch-out-for-operation-clean-sweep-maryland/ar-BB1jY1rr). These expenditures are unsustainable, especially given recent fiscal shortfalls. This joint research proposal, submitted by District 3 and Prince George's County Department of Public Works and Transportation (DPW&T), aims to evaluate litter hot spots at the census tract level, as current efforts have not addressed the root causes of the issue. Prince George's County, a well-resourced and educated area, presents unique challenges, suggesting the problem extends beyond awareness or resource deficits.	The desired deliverables for this project include: - Identified targeted problem areas (using Census-track data), guiding an equitable allocation of funds and addressing both financial and environmental concerns. - A final report and 2-page summary that documents the process for other SHA Districts to achieve similar goal, protecting infrastructure, reducing costs, and yielding significant environmental benefits.	The selected research team will be asked to assess the Litter Dashboard or illegal dumping locations and problem areas; review having "Dump Days" in prominent areas; and work in conjunction with Prince Georges County Department of Public Works

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RFP#07	Improving Internal Communications with SHA Employees	Approximately 20 years ago, the Maryland State Highway Administration (SHA) conducted a research project to audit its internal communications processes. Many of the concerns identified in that study still exist today. The challenge the agency is facing is a large portion of its employee population are frontline workers who do not have indoor offices equipped with computers nor access to work phones. Their offices are our roadways. While the challenges are similar, there are more options to make improvements, with advancements in technology and a changing workforce, there are many more tools and resources available for the agency to communicate with its more than 3,000 employees spread across the state. SHA's Office of Communication would like to conduct a study that examines the current methods used to reach employees to provide internal announcements such as training opportunities, HR information and agency accomplishments; hear what information employees want to receive and how they want to receive it; and identify strategies and best delivery methods to reach frontline employees effectively to ensure that every employee regardless of where they work has access to essential agency communications. This research will review the previous research and surveys to assess the recommendations provided and develop new recommendations for the following research questions: -- How is SHA communicating internally with office staff and those in the field, many without regular access to work phones and computers? -- What are the most effective ways to communicate with facility maintenance technicians (FMTs) and other field staff? -- Are field staff and office staff satisfied with the way SHA is currently communicating to them? -- How do staff – field and office – want information communicated? -- What information does staff want to be communicated, information to: -boost morale? -engage employees with the agency as a whole and not simply just within their departments? -ensure they are getting information that can provide employee growth and improve their quality of work / life balance? This study will help improve how SHA communicates with all employees, including front line workers, by identifying strategies based on the findings from focus groups and/or surveys. The results will lead to a more engaged workforce and ensure that essential information reaches these critical employees.	A report that summarizes qualitative and quantitative research results to better understand how SHA's employees, including frontline employees, would like to receive communications about essential information; recommends ways the agency can communicatee internally effectively and provides an implementation plan and a tool to periodically evaluate and refine the communications process.	