FFY2026 Request for Research Proposals

	Research Title	The problem needing solution	Desired deliverable?	Special Requirements
RFP# 01	Invasive species control	The Maryland State Highway Administration (SHA) faces persistent challenges in managing invasive plant species across its rights-of-way in all districts. These species—including Callery pear (Pyrus calleryana), running bamboo (various genera), and Johnsongrass (Sorghum halepense)—outcompete native vegetation, degrade biodiversity, and require significant resources to control their spread and encroachment. Callery pear, particularly the Bradford variety, spreads rapidly and cross-pollinates with other cultivars, producing fertile offspring that invade natural ecosystems and reduce native plant diversity. Running bamboo, including regulated Tier 2 species such as Golden Bamboo (Phyllostachys aurea) and Golden Groove Bamboo (Phyllostachys aureosulcata), exhibits vigorous growth and resilience, colonizing uncultivated lands and neighboring properties. Johnsongrass, a noxious weed in Maryland, has expanded its range significantly in recent years and continues to threaten native habitats and agricultural areas.	The required deliverables for this project include a literature review, final report and 2-page summary detailing the results of the research and recommendations for implementation. SHA seeks innovative, cost-effective forest management strategies and landscaping alternatives to address these invasive species. Proposals should include: - Recommendations for controlling and removing Callery pear populations - Sustainable landscaping solutions to eliminate bamboo infestations - Effective management practices for Johnsongrass suppression - Use of the Mid-Atlantic Invaders Tool (https://www.invasive.org/MidAtlantic/graminoids.cfm) to identify additional highly invasive grasses in Maryland and potential remediation strategies The goal is to reduce long-term maintenance costs, restore ecological balance, and enhance the resilience of SHA-managed landscapes. A potential enhancement can be developed as an add-on to run in the existing GIS database housing the locations of all tracked invasive species.	
RFP# 02	Friction Characterization/Classification of Maryland Asphalt Mixes using Dynamic Friction Testing and Three Wheel Polishing Machine	Road surface friction characteristics are very important to determine safety of commuters while they apply brakes. More than 20% of accidents happen due to low friction value of road surface. This is a public safety issue, which needs to be addressed. SHA OMT has been collecting Dynamic Friction Testing (DFT) data on virgin aggregates used in asphalt mixes for the last three decades and predicting weighted average of DF (micro texture) value of asphalt mixes based on used sources of aggregates in the asphalt mixes. The prediction of DF value of asphalt mixes is not as accurate as the direct measurement of DF value on the actual asphalt mix. No equipment was available in the market to make 20in by 20in asphalt slab in the past, but now new equipment is available in the market to do so. We can make asphalt slabs in the lab and directly perform DF testing on these slabs to obtain the true friction performance of asphalt mixes. Based on DFV, the asphalt mixes can be classified as high, standard and low friction mixes. The pavement designer can choose mixes per need of road surface and accidents due to low road friction will be reduced. Based on the research study, SHA will be able to predict road surface performance with respect to friction characteristics, contributing to safer roadways. By enhancing the ability to assess pavement friction, this research has the potential to reduce accidents caused by low-friction surfaces. In terms of testing methodology, performing tests on aggregate sources—approximately 45 in total—is significantly more costly and labor-intensive than direct testing on asphalt mixes (the number of active asphalt mixes used annually on MDOT projects is 15 to 20. Sample preparation and Dynamic Friction (DF) testing on virgin aggregates is longer, taking about 7 days, compared to just 3 days for asphalt mixes. Furthermore, sample preparation for DF testing on virgin aggregates is highly dependent on the technician's expertise, introducing potential variability in results. In contrast, preparing asphalt samples is less subjective, leading to more consistent testing outcomes and reduced variability.	The required deliverables for this project include a literature review, final report and 2-page summary detailing the results of the research and recommendations for implementation. Anticipated results based on the completion of this project will include a sound methodology and proof of the reduction of time required for testing. SHA seeks the following outcome from the research – The asphalt mixes will be classified as high, standard and low friction mixes and can be selected by designer for pavement design. SHA will be able to predict the performance of road surface regarding fiction characteristics and the state will have safer roadways.	Development of a detailed Implementation Plan with recommendations for action steps for full implementation within a year after partnering with stakeholders.

RFP# 03	Wetland and Waterway Mitigation Forecasting Tool	This research project aims to reduce SHA capital project delivery risk due to the lack of wetland and stream mitigation availability. Wetland and Stream mitigation is a critical path activity in the Wetland and Waterway Application process. Because it is SHA practice to receive all permits prior to contract advertisement it becomes a critical path activity for any capital project in which a wetland and waterway authorization with mitigation is required. The Environmental Programs Division (EPD) serves as a support Division on SHA projects that obtains permits for impacts to resources regulated by the Maryland Department of the Environment (MDE) and the U.S. Army Corps of Engineers (USACE), including wetlands and waterways. As part of the permit application/authorization process, EPD also identifies wetland and stream mitigation opportunities when required, which must be reviewed and approved by the regulatory agencies prior to permit issuance. Currently, EPD identifies mitigation needs and opportunities in a reactive fashion, waiting to receive plan sets/impact plates from the design team prior to identifying mitigation requirements and investigating opportunities to satisfy those requirements. This strategy is problematic as the timeframe to identify mitigation solutions can be as short as 6 months and as long as 3 years, depending on the type of mitigation available (established mitigation bank credit purchase, permittee-responsible mitigation, etc.). If no mitigation bank is available in a project watershed, as is often the case, then the potential need for a 3-year window to deliver permittee-responsible mitigation can put an entire project timeline at risk. By developing a mitigation forecasting tool, EPD hopes to be proactive when identifying wetland and stream mitigation solutions rather than reactive. Ideally, EPD would be able to use a simple centroid point representing a project's location combined with basic assumptions about the size and type of project being proposed to determine very early on in a project lifecycle whether mitigation is likely required and what resources are available to satisfy those requirements. This would give EPD more time to determine what mitigation route to pursue to deliver a project's needs and would lower the overall risk. One research objective of this project is to develop a geospatial model with associated environmental layers (National Wetlands Inventory, soils maps, Department of Natural Resources threatened and endangered species, etc.) that can be used to predict a project's wetland and waterway impacts and associated mitigation needs based off of project location data combined with assumptions on the footprint of various projects (roadway expansion, bridge replacement, etc.). The second research objective is to use the information regarding anticipated aquatic resource impacts to determine available mitigation pathways (mitigation bank credit purchase, permittee-responsible mitigation site construction, etc.) based on resource availability within a project's watershed. A major task in the development of this tool would be the testing of estimated project footprints against historical projects to determine the accuracy and refine our assumptions on these footprint estimates.	The required deliverables for this project include a literature review, final report and 2-page summary detailing the results of the research and recommendations for implementation. The expected outcome of this research is to fundamentally change how EPD approaches Wetland and Waterway mitigation, moving from a reactionary model to a proactive model that enables EPD to develop a plan to deliver successful mitigation very early on in a project's lifespan. By developing a successful forecasting tool to identify mitigation requirements and solutions earlier in the project design process, we will save on SHA capital project resources. With tighter budgets at SHA anticipated over the coming fiscal years, now it is more important than ever to efficiently use monetary resources and to ensure that projects moving forward can do so successfully without wetland and waterway mitigation issues causing delays. The products of this research project could also be made available to stakeholders through interactive online maps which could present the layers of environmental data in relation to project footprints, keeping the stakeholders aware of mitigation status.	
RFP# 04	Aquatic Organism Passage Design Methods for Culverts: Effectiveness and Sustainability Phase II	The Office of Structures (OOS) has been trying a variety of design modifications of roadway culverts to improve passage since the 1970s. Inspections of culverts by SHA engineers reveal that stream channel instabilities and debris blockages caused by undersized culverts resulted in minimizing the positive impact of the aquatic organism passage (AOP) methods over time, as well as degrading their flood flow capacity. Given environmental agencies' increasing concerns regarding AOP, and the large number and cost of waterway crossings replacements, the OOS would like to continue the research project that started in 2021 to conduct site examinations to evaluate current practices. Phase I of this project covering both Western and Eastern Coastal Planes has been successfully completed and the remaining portion of the state includes Piedmont and Western Maryland regions. Given the topographic differences of Maryland physiographic regions, and the need to perform extensive field evaluations in addition to plan reviews of hundreds of sites, it is more feasible and practical to conduct the proposed research in two separate phases. Therefore, we would like to focus on Piedmont crossings in Phase II and address the Western Maryland regions in Phase III, upon the successful conclusion of Phase II, with the goal to ultimately complete statewide evaluation of SHA AOP practices effectiveness and sustainability. The purpose of this research project is to better understand aquatic organism passage issues, to identify the potential for improvement with various types of AOP solutions for implementation at OOS culvert replacement and rehabilitation projects, and to verify the long-term sustainability of these AOP solutions in various physiographic regions statewide. The research objectives for this project include: -Improve techniques for SHA structure replacements that will remove AOP barriers. -Understand conditions (hydraulic and physical) where long-term sustainability and project success should or should not be expected. -Develop or determine the appropriate AOP improvements for varying highway crossing and culvert configurations and stream morphologic and hydraulic conditions needed to ensure long-term sustainability.	The required deliverables for this project include a literature review, final report and 2-page summary detailing the results of the research and recommendations for implementation. The research findings will help to facilitate coordination with SHA partners and regulatory agencies for project delivery and environmental permitting and are expected to receive public and stakeholder support. Integrating the results of the research into existing design procedures will provide a set of guidelines for practical and effective designs, and nature-based solutions to assure adherence to the environmental regulations. The project will provide supporting strategies, and holistic approach principles for project planning and development to maintain safe and environmentally friendly transportation infrastructure statewide. The results of this study will be used to develop AOP design guidelines to be included in the OOS SHHD Design Manual.	

RFP# 05	Proof Load Testing of Sign Clips and Railing	At OOTS/TEDD, we are currently in the process of upgrading the structural standards for overhead sign structures. During our review, we observed that the aluminum extruded panels and their supporting systems—including sign clips—have not yet been evaluated against the updated AASHTO wind load and impact criteria, specifically the 3-second wind gust requirements. These changes are largely driven by evolving environmental conditions associated with climate change. Given the significance of these updates, a comprehensive reevaluation of these materials and systems is essential to ensure compliance and structural integrity moving forward. This research will help SHA ensure that all overhead sign structures meet current safety and durability standards, especially in light of increasing wind events due to climate change. It will also reduce long-term maintenance costs and potential liability by ensuring structures are more resilient and compliant with national standards. The main outcome of this research is to develop updated structural standards for overhead sign structures, with a specific focus on evaluating aluminum extruded panels and their support systems, including sign clips, against the latest AASHTO wind load and impact criteria (3-second wind gust). We aim to determine whether current materials and designs can meet these new demands or if redesign and material upgrades are necessary.	The required deliverables for this project include a literature review, final report and 2-page summary detailing the results of the research and recommendations for implementation. By evaluating aluminum extruded panels and support systems against the latest AASHTO wind load and impact criteria, the research will provide evidence-based recommendations for material selection, structural design, and safety standards. This will guide revisions to SHA's structural specifications and policy documents to reflect current environmental challenges and national standards. If the research concludes that new design or material standards are needed, the findings can be integrated into existing structural design manuals, procurement specifications, and project review processes. Additionally, SHA can update internal training programs to align with the new standards and work closely with contractors and suppliers to ensure a smooth transition to updated practices and materials.	
RFP# 06	Alternatives to Leased Circuits – Phase II	Since inception, the State Highway Administration's (SHA's) CHART (Coordinated Highways Action Response Team) program has relied on leased circuits from telecommunications service providers to connect with high bandwidth field devices, like closed-circuit television (CCTV) cameras, to its Advanced Traffic Management System (ATMS). The increasing costs of these copper-based circuits, pending obsolescence of the technology, and recent innovation of better performing alternatives (e.g., fiber installation, microwave, wireless, etc.), has prompted SHA to investigate and plan for a possible transition out of legacy leased circuits. There is a research project underway to identify and assess efficient, reliable, and affordable alternative options (i.e., Phase I) to which this research project will be a follow-on exploration (Phase II). Through Phase I, two options seemed to meet the reliability, efficiency, and affordability metrics identified by the team. These are: (1) commercially available wireless options and (2) licensed public safety bandwidth for last-mile connectivity, where applicable. Of those two options, the commercially available wireless option appears to more feasible and more applicable to OTMO's operations. Therefore, the follow-on research project would conduct a nationwide inquiry to assess whether and how other transportation agencies have transitioned into a fully wireless option to support its communications infrastructure and their experiences to date. In doing, so, the research would also evaluate the feasibility, cost, reliability, bandwidth (i.e., can it support the totality of OTMO operations), risks and, ultimately, whether a complete wireless communication option is beneficial.	The required deliverables for this project include a literature review, final report and 2-page summary detailing the results of the research and recommendations for implementation. There is a research project underway to identify and assess efficient, reliable, and affordable alternative options to which this research project will be a follow-on exploration. Specifically, the research would conduct a nationwide inquiry to assess whether and how other transportation agencies have transitioned into a fully wireless option to support its communications infrastructure and their experiences to date. In doing, so, the research would also evaluate the feasibility, cost, reliability, bandwidth (i.e., can it support the totality of OTMO operations), risks and, ultimately, whether a complete wireless communication option is beneficial. It will also lead to a procurement and implementation of the recommended options on a pilot basis.	
RFP# 07	Supervisor's Handbook	Supervisors do not have one central space or resource to refer to for policies, procedures, resources, forms and other tools to assist in their supervisory role. They have an impact on employee engagement and retention and therefore need proper skills to effectively manage people. Often supervisors carry a workload or are managing projects of their own and need a resource to quickly access important information. Developing a "guidebook" or automated resources for sharing information targeted to supervisors and their day-to-day challenges is an essential tool needed for effective and efficient management. Successful research will include determining what skills supervisors need to effectively engage and manage the workforce. Some skills will be specific to SHA and others will be more global and typical to anyone supervising other people.	The required deliverables for this project include a literature review, final report and 2-page summary detailing the results of the research and recommendations for implementation. The research will be outcomes anticipated include: developing an automated or other technology-based resource and/or hard copy handbook that can be periodically updated and made available to all supervisors via SHA's intranet or a SharePoint page specifically for supervisors. Implementing this project will lay the groundwork for providing supervisors with important tools and information and will also create a space where information can continually be updated and renewed.	