New Jersey Department of Transportation
Intelligent Transportation Systems Resource Center (ITS-RC)
Request for Proposal
2025-2028 SPR Program

Project Title: Intelligent Transportation Systems Resource Center (ITS-RC)
Posting No.: 2024-02
Date of RFP Announcement: 08/27/2024
Closing Date: 10/15/2024

NOTE: Due to P.L. 2019, c. 196, the New Jersey Department of Transportation cannot award research grants to PRIVATE and/or OUT OF STATE institutes of higher education.

Proposals must be prepared in accordance with NJDOT's *Supplemental and Proposals guidelines.* Please visit https://www.state.nj.us/transportation/business/research/guidelines.shtm for the most current version.

All proposals must also have a corresponding online PreAward Risk Assessment form completed and submitted by the Principal Investigator (PIs) prior to the RFP closing date and time. This online form can be found at:
https://www.state.nj.us/transportation/business/research/risk_assessment_forms.shtm

1 - PROBLEM STATEMENT AND OBJECTIVES

1.1 Problem Statement

The New Jersey Department of Transportation (NJDOT) is seeking a qualified University to run the established Intelligent Transportation Systems Resource Center (ITS-RC) Program, and assist with its continuation and support in improving, applying and implementing comprehensive ITS and Transportation Systems Management and Operations (TSM&O) strategies that maximizes technology advancement, deployment and evaluate performance effectiveness, human and capital resources utilization to improve safety, mobility, and traveler information for the motoring public.

ITS-RC will address core elements and undertake new planning, outreach, training, technology transfer and other activities.

1.2 Objectives

The ITS Resource Center was established by the New Jersey Department of Transportation in 2008 to utilize extensive technological resources and expertise of academia and their partners in assisting NJDOT towards developing and implementing a comprehensive Intelligent Transportation Systems (ITS) management strategy. New Jersey recognizes it cannot solve most congestion issues by expanding roadways. ITS is a means of optimizing utilization of existing capacity for harmonized throughput and overall efficiency of the transportation network without the challenges of extensive right of way (ROW) needs for roadway widening; most improvements are made within the existing ROW. With limited resources and a challenging atmosphere for road widening, the focus has shifted to getting more utilization of existing capacity through deployment of 'smart technology,' better known as ITS, accompanied by enhanced incident management operations and intensive special

event operations. Moreover, these new transportation technologies and tools create opportunities for emission reductions, if they are assessed, planned, and implemented strategically.

The Resource Center consists of a collaborative and comprehensive program (Program) that has developed into a premier statewide resource for NJDOT's planners and engineers regarding the improvement of ITS and Transportation Systems Management and Operations (TSM&O). The program includes evaluating state-of-the-art ITS practices and provide expertise in developing, implementing, and evaluating innovative ITS applications, Incident Management response, coordination and training, innovative business processes, planning and management strategies, agency collaboration and information exchange. It also is a comprehensive resource for data and models necessary for generating reliable measures of system performance, which is used in decision making processes and provides the needed technical, analysis, education, and knowledge transfer necessary to support the Department in improving safety, mobility, and efficiency of New Jersey's surface transportation systems. The Program also provides ITS technology, evaluation, planning and pilot deployment support as appropriate in the Department where it may assist in advancing the Department's overall mission of improving lives by improving transportation.

The overall goal is to enhance NJDOT's Transportation Systems Management & Operations goals through the determination of available cutting-edge ITS resources through technology assessment, evaluation of ITS implementation strategies and scenarios, applications of advanced modeling and simulation tools for corridor planning and management, evaluation of emerging concepts, applications and technologies, and technology transfer. Moreover, this Program is a resource available through the NJDOT to facilitate partnerships between federal and state transportation agencies, metropolitan planning organizations, transit operations, academia, private industry, and other entities that promote and advance implementation of ITS technologies in New Jersey's transportation system. This partnership is reflected in the involvement of these entities on a regular basis.

The objective of the ITS Resource Center Program is to identify, enhance, guide and strengthen the State's direction and decision making in the activities of NJDOT Transportation Mobility. Since its inception, the Program has conducted these types of core activities:

1. Applied studies and program evaluation/analyses;
2. Concept of Operations documentation;
3. Training and education;
4. Operations Center evaluations and improvements;
5. Safety Service Patrol and Incident Management Response Team assessments, improvements, evaluation, assessment, and deployments;
6. Technical and Executive Management assistance; and
7. Outreach and information dissemination.
8. Conduct ITS Feasibility, ConOps and Concept Development and System Requirement Studies for ITS and TSM&O Pilot Applications; and

9. Provide Program Management/Communication Protocol and Methodology for Technical Leads.

Tasks [Provide a listing of appropriate general tasks divided into phases based on types of work (e.g., laboratory, field) or by year (e.g., year 1, year 2) or other appropriate milestones] The NJDOT is seeking the insight of proposal responders on how best to achieve the objectives. Proposers are expected to describe a study effort that can realistically be accomplished as expeditiously as possible. Proposals must present the proposers' current thinking in sufficient detail to demonstrate their understanding of the problem and the soundness of their approach for conducting the required study.

PHASE I – Literature Search Conduct a literature search of the current state of the practice. After the award of the project, a more comprehensive literature search should be conducted. At the completion of this literature search, the PI will make a presentation to the Technical Advisory Panel (TAP) to discuss their findings and to discuss the appropriate study.

PHASE II – Evaluation Approach and Anticipated Results

Clear description of how you will solve the problem and implement anticipated findings. Work may be divided into phases (e.g., Laboratory, Field or Year 1, Year 2) as necessary to clarify tasks. *Exit Criteria* must be developed during this phase.
For all tasks identify accepted standards or practices anticipated to be utilized in the proposed work program.

Task 1: Best Practices Study and Strategic Planning/Policy Development

TSM&O and ITS techniques, technologies, policies, regulatory environments, and practices continue to rapidly change. To assist NJDOT in adopting practices and technologies to respond to these changing landscapes and to address relevant emphasis areas identified in federal transportation legislation, conduct high level Best Practice national/international scans annually for:

1. All Departmental-related traffic operational and deployment aspects including Traffic Incident Management, Safety Service Patrol, Central Dispatch, Incident Management Response Team and Traffic Operations Centers, and related software and technologies; Comprehensive TSM&O Management Systems incorporating elements of ITS engineering and systems, management systems, freight management, smart cities technologies, Connected Vehicle (CV2X), financial and capital management and mobility systems engineering and related deployment aspects including, traffic management plans (TMP), other work zone (WZ) practices and technologies in a national/international scan. Review and recommend improvements, focusing on the use of ITS and TSM&O technologies and strategies; best practices relating to a traffic operations center (TOC) evaluation and improvement program that reviews and incorporates best practices from around the country.

2. Develop a recommendation for a comprehensive and formal TSM&O Management System that incorporates appropriate measures and elements of Transportation Mobility, Mobility Engineering, and Traffic Operations to provide input to other Departmental functions. Utilize lessons learned in Best Practices scan. Propose an implementation methodology to include a feedback-loop with a given time frame, and updates. Propose means to connect this new Management Strategy with the NJDOT ITS Strategic Deployment Plan (SDP) as well as Departmental capital programming.

3. Develop and support implementation of NJDOT ITS Strategic Deployment Plan (SDP), and related policy study to ensure updates and communication with multiple Department units occur and the SDP moves forward towards identified goals. Propose process for improving integration with Capital Investment, Statewide Planning, Traffic, and Capital Program units, and incorporated freight planning ITS component to the SDP for traditional and emerging applications such as Connected Vehicle (CV2X) and Wrong Way Driving Vehicle Detection System. Evaluation, quantify and support the tools, techniques, and outreach as appropriate for ITS and Transportation Systems Management and Operations (TSM&O) strategies and technologies as identified in the current SDP for consideration in the transportation planning, capital programming and project delivery processes to improve integration of planning and operations and document recommendations.

4. In concert with TSM&O statewide partners, as well as within the Department, contribute to the development, planning, evaluation, adoption, training and implementation of the Connected Corridor, Wrong Way Vehicle Detection System, ITS Architecture, and the Capability Maturity Model (CMM) frameworks and plans for New Jersey.

5. Assist in integration of performance-based planning and programming concepts in deployment plans for ITS and TSM&O strategies, and as part of the Smart Growth Investigative Team and related statewide planning efforts such as the Long-Range Plan update, congestion management support, and tool selection. Create draft ‘report card’ type approach of TSM&O benchmarks of potential interest to NJ roadway users and set up transferable database to automatically extract information into said Report Card utilizing already-identified performance measures and ones anticipated to be incorporated in the TSM&O Management System. Include available and emerging technologies and road users that are interacting with and on the roads as well as those behind the scenes that can result in improvements. TSM&O seeks to improve transportation, special event related traffic, and minimize impacts of major roadway construction projects. Support, document, and participate in TSM&O programs and outreach initiatives such as the ITS SDP update process, Complete Team, Connected Corridor, and Statewide ITS Architecture in collaboration with NJDOT, FHWA, MPO, and other stakeholders.

Deliverables

Provide appropriate deliverables, such as memos and reports, within the agreed upon time frame.

Task 2: Develop and Conduct TSM&O and ITS Training, Technology Transfer and Outreach

Develop and execute an overall ITS/TSM&O annual plan for training in specific areas of traffic management and operations that builds upon training to date to enhance the effectiveness of NJDOT and local agency incident management-related personnel. Provide ITS and TSM&O training and technology transfer and outreach for NJDOT and other agencies, a critical measure in the rapidly changing and emerging technology of traffic operations and management. Provide these opportunities to all areas of the Department performing activities related to ITS. Ensure adequate training so all existing and new personnel have appropriate levels of utilization of technologies, software, and other tools they utilize. A full range of Peer-to-Peer, in-person instruction, workshops, webinars etc. and technology transfer training opportunities should be included. Arrange invitations, attendance.

Deliverables
Provide appropriate deliverables, such as memos and reports, within the agreed upon time frame.

Task 3: Data Analysis Tools, Solutions and Analysis to Support TSM&O and Transportation Planning for Operations

1. Conduct analysis and develop a framework for collecting and assessing the best methodologies for extraction, analysis, and utilization of data for performance measure criteria. Provide assistance, evaluation, and technical support for data acquisition, integration, analysis, innovative solutions, performance measure evaluation, reporting, and visualization for transportation planning and operations, including smart city data needs, for data synthesis/engines for real-time optimization, situational awareness and predictive analytics as needed. Support collaboration internal and external through various committees.

2. Conduct studies and develop a framework for utilization of mobile data collection from Departmental, partner agency and external sources. Consider the use of DOT fleet for pilot application: traffic, weather, infrastructure condition data, cameras, AVL, etc.

Deliverables
Provide appropriate deliverables, such as memos and reports, within the agreed upon time frame.

Task 4: Traffic Operations Capacity Building and Freeway Management

1. Collect information and practices from other existing TOCs and Central Dispatch Centers (CDU) and conduct traffic operations and CDU evaluation studies to assess technical, logistical, and human capital requirements and scheduling for optimal 24-hour functionality, considering NJ's unique traffic operation parameters. Develop Concept of Operations design and propose process for testing and implementation. Develop a methodology for deployment of improvements.

2. Evaluate studies and develop a formal Safety Service Patrol (SSP) Program that considers national best practices and encompasses multiple parameters and culminates in an easily updatable Operational Manual, utilizing accepted national guidelines. Continue to update/provide manuals and training. Conduct and create concept of operations for utilization of permanently installed cameras on SSP trucks and IMRT vehicles.

3. Develop a program that conveys the Slow Down Move Over/Safe Passage regulations in a pictorial or multi-lingual sign format for placement along roadsides; evaluate placement locations and design options that maintain any regulatory compliance requirements.

4. Evaluate the performance of NJDOT Traffic Incident Management (TIM) programs and provide recommendations for program improvements. Building on the existing adopted statewide TIM plan and related working group input, recommend and update the existing adopted plan through plan updates, Statewide Committee review with comments, and adopting, meeting/exceeding national guidelines. Expand and foster interagency coordination and enhance collaboration and communication among the agencies participating in traffic incident management.

5. Support for the Department's Traffic Incident Management (TIM) programs are vital and must be continued without interruption. Continuation of the services provided by current key analyst staff is highly recommended. In addition, all aspects of the current TIM support website must continue without disruption of service, which includes but not limited to maintenance, monitoring, adding, editing, etc. Assess capabilities of current practices of traffic operations (weekly calls, TMP reviews, etc.) with other Departmental functions (construction for ex.,); test and recommend optimized practices.

Deliverables
Provide appropriate deliverables, such as memos and reports, within the agreed upon time frame.

Task 5: Work Zone and Related Mobility Monitoring and Improvement Study

1. Conduct interactive review of best practices with iterative feedback loop to test and improve work zone monitoring utilizing NoCOE and other nationally accepted measures.

2. Develop work zone monitoring programs for utilization in evaluating WZ ITS strategies. Test usefulness in pilot applications as an online application with a backend database. Program to include instrumentation of select work zones to collect background data in support of development, testing and evaluation of mid- and long-term work zone management plans. Reference FHWA WZ ITS Implementation Guide for defining project needs assessment, deployment of appropriate WZ ITS data collection, performance measures and effective WZ management.

Deliverables
Provide appropriate deliverables, such as memos and reports, within the agreed upon time frame.

Task 6: Technical Support for Technology Evaluation and Deployment

1. Provide Technical Support for Technology Evaluation and Deployment: Conduct innovative ITS technologies and TSM&O strategies pilot and deployment studies and assess feasibility of implementing, costs and effectiveness for traffic operations, incident management, traffic and related surveillance, data collection, and related areas. Provide support from NJ Professional Engineering firm for design, structural analysis and as-built. Propose evaluated and structured guidelines and specify methodologies to be utilized for technology evaluations in a systematic manner, – including costs and life-cycle maintenance, implementation considerations and recommendations (as appropriate). Such studies will include but not be limited to available and emerging technologies as follows:

    A. Connected vehicle technologies and vehicle/highway automation pilot studies; incorporate CV/AV evaluations for freight/trucks, paratransit as applicable, in addition to passenger vehicles. Utilize FHWA V2I guidance and products to ensure interoperability, efficient and effective planning, procurement, and operations. Also utilize/reference FHWA CV Reference Implementation Architecture to ensure appropriate use of CV Standards regarding software programming (codes, definitions, formats) to create interoperable, consistent, and seamless communication data exchange.

    B. Evaluate, explore, investigate, and develop the application of Artificial Intelligence (AI) solutions for technical challenges for traditional and non-traditional engineering processes. Some examples include but not limited to Video Analytics, Video detections in adverse and non-adverse weather and light conditions, recurring and non-recurring congestion determination

    C. Connected and automated vehicle policy assessment and deployment/utilization of for NJ, relating to requirements for in-state test bed locations, on-road testing, and develop recommendations for regulations/legislation necessary to safely implement operating same for pilot tests within the state of NJ.

    D. Unmanned aerial vehicles (UAV) (drones) for remote traffic video surveillance, incident management surveillance, bridge inspection and evaluation, Light Detection and Ranging (LiDAR)-Assisted accident site reconstruction, WZ and special event reconnaissance, and UAV to Vehicle or other communication center, and incorporating appropriate federal regulatory compliance.

    E. On-call support to NJDOT related to ITS technology study, evaluation and potential deployment of pilot applications.

2. Traffic simulation and analysis models as needed to evaluate and test modifications to existing practices/solutions utilizing existing and emerging technologies.

3. Test and conduct pilot studies for emerging technologies, applying earlier lessons learned.

4. Assist and support implementation of testing center/laboratory at NJDOT facility for Connected Vehicles and emerging technologies. Develop implementation plan and coordinate with various stakeholders including NJ Office of Information Technology (OIT), vendors, consultants and obtain necessary approvals for implementation.
5. Assist and support the agency in existing and ongoing technical tasks of testing and evaluating connected technologies and AI solutions applications with technical teams comprising of diverse subject matter experts at NJDOT facility or as identified by the agency.

Deliverables
Provide appropriate deliverables, such as memos and reports, within the agreed upon time frame.

Task 7: Conduct ITS Feasibility Studies, Concepts of Operations, and System Requirement Studies for ITS and TSM&O Pilot Applications

Follow the Federal and Regional systems engineering process ('V diagram') and the ITS Architecture for all the following tasks, and provide recommendations and lessons learned based upon outcomes for:

1. Conduct high-level concept of operations (ConOps) studies, including for the following potential applications utilizing the FHWA Regional ITS Architecture by following the systems engineering process ('V diagram') and the ITS Architecture

2. In this task, for each activity where a high-level ConOps effort was completed, develop more detailed and refined System Requirements Specification studies for completed ConOps studies. Ensure the needs identified in the ConOps are satisfied and that all applicable ITS Regional Architecture standards are met. These pilot efforts are intended to test and improve results utilizing the V-diagram process as well as integrate multi-agency communication/outreach to support successful long-term utilization. Develop high-level system design documentation to define the overall system framework, detailed design specifications for system components and integration, verification, and validation plans. Use the FHWA recommended Regional ITS Architecture and Systems Engineering processes for ITS project development and planning to ensure project/user needs, institutional agreement, technical integration, and requirements are met.

3. As part of the V-diagram systems engineering process, develop and test traffic demand and other traffic models, and conduct simulations for testing select ITS and TSM&O applications. This step involves data collection, simulation development, studies and selection of

appropriate modeling options, model evaluation of impacts, and analysis of operational strategies, identifying those strategies best suited to meeting stated goals established earlier in the V-diagram process. Ensure all recommended Regional Architecture and Systems Engineering processes are utilized and requirements met.

4. Maintenance and update NJ ITS Architecture: Building on previous activities conducted to generate an update to the statewide NJ ITS Architecture, an ongoing maintenance effort shall be conducted. These activities will work to ensure that upcoming ITS activities planned by agencies and municipalities are reflected in the NJ ITS Architecture. The update effort will also enable the agencies to identify opportunities to either learn from others regarding the tasks necessary to implement ITS solutions that are of interest to them as well as to identify potential opportunities to coordinate and connect/partner on mutually beneficial ITS projects that offer coordinated solutions to improve transportation network.

    A. NJDOT and partner agencies ITS system analysis: In support of the baseline program information data collection efforts conducted, follow up, outreach and support activities shall be provided to both principal agencies, local municipalities to facilitate data sharing and infill to align/pair system deployments throughout New Jersey. This will support needed updates to the NJ ITS architecture to reflect planned and current activities.

    B. NJ ITS Architecture Documentation Updates: Based ongoing agency feedback and maintenance activities along with outreach efforts to statewide agencies working on ITS activities, the NJ ITS Architecture shall be updated, including but not limited to:
        i. Statewide Architecture
        ii. Market packages
        iii. Local Aid support documentation
        iv. Systems Engineering Analysis Report (SEAR)

Deliverables
Provide appropriate deliverables, such as memos and reports, within the agreed upon time frame.

Task 8: Program Management

1. To ensure satisfactory progress this task is integral to overall program success and covers all contract/technical management responsibilities to ensure all activities are undertaken as well as possible and within the parameters of the Basic Agreement and awarded Task Order. Select and identify a single individual to be sole source of contact with technical Department management and contract management. Describe communication protocol that will ensure all communication is conducted with the involvement of this individual and their technical TSM&O counterpart. Also provide management/communication protocol and methodology for technical leads in completing activities. Provide copies of any/all subcontracts/scopes and

describe quality assurance measures that will be utilized to ensure timely deliverables receipt.

2. Meet with TSM&O technical staff management as appropriate, at a minimum once a month for management meetings. Attend conference call and technical activity meetings to review current progress, discuss and resolve obstacles as needed. This monthly progress meeting is separate from technical activity meetings. Propose options for resolving management, contractual or deliverable obstacles to ensure agreed upon deadlines can be maintained. Take and prepare brief meeting summaries to identify action items, outcomes, next steps, and deliverables for all meetings and provide same to TSM&O with maximum a one-week turnaround after the meeting. Oversee preparation of technical reports and provide quality control. Schedule and plan deliverable schedules with ample time for Departmental review, revision, and approval. Ensure that the Department staff are aware of all communications at appropriate decision points, including communications with sub-consultants. Explain methodology to ensure schedules provided are adhered to and detail staff support needed to ensure timely completion of all work program tasks. Assist in preparations for meetings with Department/FHWA staff in reporting progress.

3. A draft final report will be prepared, following NJDOT Bureau of Research publication guidelines, to document project activities, findings, and recommendations. This report will be reviewed by the TAP, updated by the Principal Investigator (PI) to incorporate technical comments, and then approved by the Transportation Mobility ITS-RC Project Manager before this task is considered complete. If possible, a meeting will be scheduled to facilitate the discussion of the draft report.

1.3. Special Instructions

1.3.1 Progress Meetings and Annual Reporting

Progress Meetings: Bureau of Research shall be included in ITS-RC progress and programmatic review meetings.

Annual Reporting: ITS-RC shall submit annual 10–15-page summary report of complete and ongoing activities to Bureau of Research. A sample template specific to all NJDOT resource centers/support programs will be provided.

1.3.2 Pilot, Testing, and Demo Projects

Bureau of Research staff shall serve as an extended branch of ITS-RC staff by providing funding and/or management of pilot/testing projects

1. The following were a few pilot tasks identified in the RFP:
   A. Conduct innovative ITS technologies and TSM&O strategies pilot research and deployment studies

B. Conduct feasibility studies for ITS and TSM&O pilot applications
C. Conduct pilot studies and test proposed technologies for video analytics

2. Bureau of Research can assist in applying for and managing special grants that would be beneficial to ITS efforts

1.3.3 Build on Bureau of Research's Technology Transfer Program

1. ITS-RC & Bureau of Research shall work together to identify topics and content
2. Rutgers VTC is contracted to administer our Tech Transfer program, including but not limited
   A. Articles
   B. Videos
   C. Tech Talks
   D. Training
3. Cross posting between NJDOT Tech Transfer and ITS-RC webpage

1.4 Type of Contract

It is proposed that if the Issuing Office enters into a contract because of this Request for Proposal (RFP), it will be a **Cost Reimbursement, Deliverable-Based** contract containing the Standard Contract Terms and Conditions.

2 - BUDGET and CONTRACT TIME

The **TOTAL** project budget shall not exceed **$14,000,000 US Dollars ($3,500,000 per year) US Dollars.** Budgets will be evaluated separately, and only after a selection has been made as to which proposal is the most qualified based on technical merit. Please place three (3) copies of the budget for this project in a separate sealed envelope.

The PI must provide the anticipated study duration based on the proposed tasks. Consideration should be given to potential impediments so that adjustments are incorporated into the schedule minimizing the need for time extensions. Contract time shall include sufficient time for the procurement of subcontractors, as well as no less than three months for Final Report review and acceptance. Please be advised that going forward, new task orders having permissible justification will be allowed no more than a one-time extension with the advent of 2 CFR 200.

A 48-month total project duration is preferred.

Please provide a Gantt Chart schedule, by month number (e.g., 1-24), showing tasks start/end, and deliverables. List corresponding deliverables below the chart.

3 - Oral Presentations

Oral online presentations may be requested as part of this RFP. If required, you will be notified by the Transportation Mobility Unit to schedule your oral presentation. They will be held at NJDOT

headquarters in Trenton, NJ and be limited to no more than an hour, including time for questions and answers.

4 – Deadline

Proposals (no hard copies required) are due at the NJDOT ITS-RC no later than **4:00 p.m. on October 15, 2024.** Electronic proposal documents (preferred pdf) shall be emailed to **DOT-Operations.Proposal@dot.nj.gov** with the subject: **RFP-2024-02 University – PI's name**.

Approximate Start Date: 01/01/2025. The official start date is the date that the ITS-RC obtains a signature from the Assistant Commissioner.

5 – CONTACTS

Interested parties shall send all questions related to this RFP to the ITS-RC by sending an e-mail to **DOT-Operations.Proposal@dot.nj.gov** or by phone (609-963-1381)**.** Questions on this topic **shall not** be directed to any Research Project Manager, Research Customer, or any other NJDOT personnel. All questions must be received **on or before September 15, 2024, in order to be answered.**

PROPOSAL DELIVERY INSTRUCTIONS:

Electronic proposal documents (preferred pdf) shall be emailed to **DOT-Operations.Proposal@dot.nj.gov** with the subject: **RFP-2024-02 University – PI's name**. A confirmation of receipt will be sent via email.